OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

(OTTAWA, CEDAR POINT, DARBY, NAVARRE NWR'S)

OAK HARBOR, OHIO

ANNUAL WATER MANAGEMENT PROGRAM

1986

NATIONAL WILDLIFE REFUGE SYSTEM
FISH AND WILDLIFE SERVICE
U. S. DEPARTMENT OF THE INTERIOR

OTTAWA NATIONAL WILDLIFE REFUGE COMPLEX

ANNUAL WATER MANAGEMENT PROGRAM

REVIEW AND APPROVAL

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6/5/86
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Table of Contents

WATER MANAGEMENT PLAN - 1986

This annual water management plan for the Ottawa NWR Complex provides guidelines for water levels during a difficult high lake level year.

All time high records have been recorded for the past 6 months (through April 86). The outlook for Lake Erie according to the Corps of Engineers is for the lake to remain near or above record levels at least through September 1986. These high levels are adversely impacting on refuge operations and habitat in many ways.

Most Refuge facilities were built during normal or low water years (with the exception of the 1972-73 period) and getting enough water to raise water levels in wetlands was a problem. Northeast storms have always been a problem but overall water levels have been near normal the last 25 years. In the mid to late 1970's energy conservation was a factor in the design of water control structures. Dual flap gates on screw gates that faced in opposite directions were installed. Gravity was all the energy that was needed and the system worked well during those years. The key was to have a water source that periodically fluctuated and wind tides on Lake Erie cooperated with each blow from the southwest and northeast.

With record high water levels several adverse impacts are occurring. Gravity control structures are not working, severe erosion is taking place on all unprotected dikes, and any defects in dikes and control structures are showing up. Muskrat and groundhog damage to dikes becomes more apparent as the dikes narrow from erosion and water pressure finds many of the burrows. Defects in pipes or gates become more serious as the pressure from the high water tests their utility. Carp find those dike leaks and can wallow out several feet of dike in short order.

Due to the inability to gravity drain, hundreds of acres of emergent vegetation is drowning. At Darby and Cedar Point NWR the high water level damage is most apparent. High levels in 1985 eliminated and stressed hundreds of acres in both units and levels this year will continue the process. High water at Cedar Point is causing erosion on interior unprotected dikes of the Pheasant Farm and the drainage channel between the Pheasant Farm and Pool 1.

High lake levels are causing considerable damage to many miles of dike. Those rapidly falling in are indicated on maps in the Appendix.

All is not gloom and doom. There are positive aspects in regard to water levels to report. In several marginal uplands that were mowed goose hunting fields, grow back fields, and semi-wet wetlands are now excellent emergent wetlands. They contain a wide variety of emergents with good interspersion to open water. The Navarre unit is in improving condition with active water level control the key. An interpretive

contract in 1985 provided detailed maps of the vegetation of most wetlands. In the summer of 1986 the 85 maps will be digitized by volunteers and information will be available to evaluate in a quantifiable way what was present in 1985. Photos are scheduled to be taken again in late summer 1986. Reduced copies of the vegetation maps are included in the appendix. Unfortunately due to the reductions required in size, some of the types are difficult to read.

Water levels described in this plan in many cases are planned to prevent erosion or to provide a dry work site for dike repairs. At this point in time most water level management is directed at protection and repair of Service facilities. Although vegetative responsed are secondary to maintenance activities progress is being made in improving vegetation for waterfowl in several areas.

The format in which management information is presented has been changed. Levels are displayed in a graphic form as opposed to tabular listing - it's easier to visualize what's planned. A new section on "Vegetation" will provide quantifiable information. Units will be given a ranking of 1 to 5 on successional stage with first year drawdown annuals given a 1 and open water devoid of emergents rated a 5. Vegetation types and open water will either be measured or estimated and presented in a table. Wildlife use data will be presented for geese, ducks and great blue herons. Maps of each unit will be included in the Appendix. In the narrative section all previously - required sections are included and two additional areas are briefly covered. The two are facilities condition and management costs. A section on facilities will tie maintenance needs with outputs, IPW's and perhaps the new MMS. The benefits gained from pumping by Crisafulli pumps come at a high price. This management plan is the most appropriate place to include those costs.

Unit Objectives Summary for 1986

Ottawa NWR

Pool 1 - Pump via DNR electric pump to revegetate and stop dike erosion.

Pool 2a - Crisafulli drawdown to revegetate and repair eroded dike.

Pool 2b - Crisafulli drawdown to complete dike repairs and encourage emergents.

Pool 2c - Crisafulli drawdown for dike repairs and to encourage emergents.

Pool 3 - Open to the lake, not covered.

Pool 4 - Open to the lake, no vegetation, not covered.

Pool 5 - Open to the lake, not covered.

Pool 6 - Gravity fill and hold steady to encourage muskrats to open dense cattail.

Pool 7 - Open to the lake, not covered.

Mini Marsh - Hold stable and slightly high by farm pump to encourage muskrats to open dense cattail.

Show Pool - Hold high by gravity filling to control cottonwoods.

Headquarters Pool - Crisafulli drawdown to revegetate, repair dikes and water control structure.

Moist Soil Unit 3 - Hold water as high as possible with MSU pump to control cottonwoods and for brood habitat.

MSU-4 - Drawdown with MSU pump, burn, mow and farm to control willows, cattails and reed canarygrass.

MSU-5 - Drawdown with MSU pump, mow and farm to control willow and cattail.

MSU-6 - Open to the lake, not covered.

MSU-7a - Drawdown with farm pump for moist soil plants.

MSU-7b - Drawdown with farm pump to complete dike repair.

MSU-8a - Drawdown with farm pump for moist soil plants.

MSU-8b - Drawdown with farm pump to repair water control structure. Shallow flooding to control cockleburs if necessary.

Unit Objectives Summary for '1986 (continued)

Darby

Pools 1, 2, 3, and 4 - Gravity drainage to maintain emergents.

Navarre

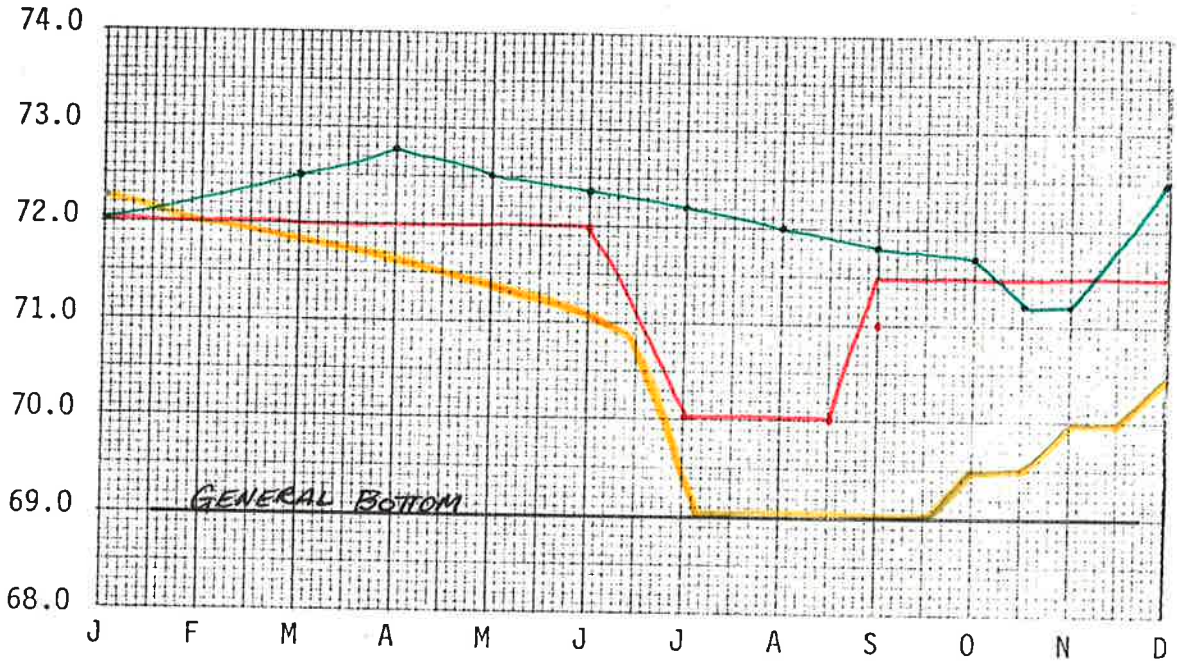
Pool 1 - Partial drawdown by Toledo Edison pump to encourage muskrats to open dense cattail.

Pool 2 - Partial drawdown by Toledo Edison pump to encourage muskrats to open dense cattail.

Cedar Point NWR

Pools 1, 2 and 3 - Gravity partial drawdown to maintain emergents.

1. Unit Pool 1
2. Acres 275
3. Maximum elevation permissible 573 (572)
4. Flowline elevation of lowest structure 570.5
5. Elevation of general pool bottom 569
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 5

Species	%1984	%1985	%19__
Open Water	65	65	
Cattail	18	18	
Aquatic smartweed	11	11	
Other	5	5	

8. Wildlife Use:

	Use Days 1984	Use Days 1985	Use Days 19__
Geese	2200	2200	
Duck	4200	4200	
Great blue heron	1000	1000	

9. Map: See Appendix

10. Purple loosestrife: Small scattered stands noted in southern portion.

Pool 1

A.2 Effects of Past Year's Water Levels

Levels: High lake water levels throughout the spring and summer prevented the lowering of water levels as planned. Levels remained approximately 6-10 inches higher than planned until mid-October when water from this unit was used to reflood Pool 2. Actual levels increased from 572.00 to 572.75 during the spring period and then slowly decreased to 572.00 again by late summer. In mid-October, levels were reduced to 571.20 for a short period, but rains returned the levels to 572.5 by the end of the year.

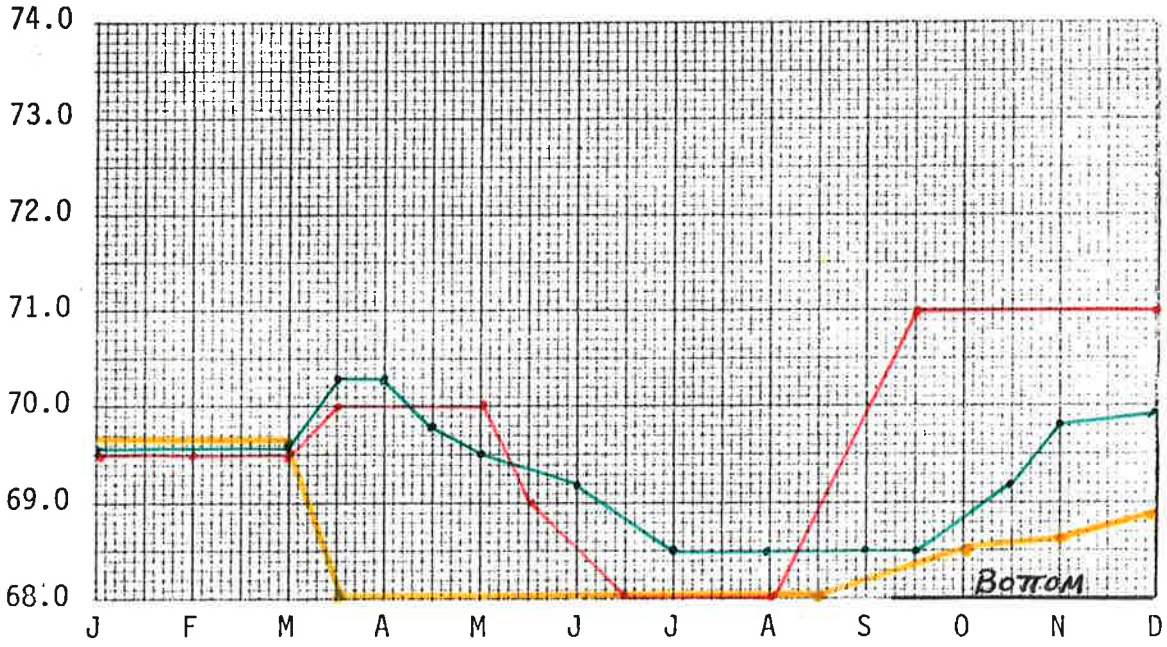
Results: Vegetation in the unit is currently in poor condition with stands of cattail and aquatic smartweeds only on the highest areas. Open water areas are substantial, relatively shallow and they were devoid of submergent vegetation. Muskrat activity was high with houses noted throughout the vegetated areas.

Facilities: This unit is in fair condition, except for the northeast dike; portions of the west and southeast dikes which are severely eroded and narrow. These dikes are becoming very narrow and are within a few years of failure. The NE dike is not drivable. The W dike is nearing the edge of the road and the SE dike is close to failure. Other dikes are in good condition.

B.2 Objectives of the 1986 Proposed Water Levels

Excess spring water will be allowed to drain off in April and May as much as possible. However, little reduction is anticipated due to expected high water levels. If a connection is cleaned between Pool 1 and the adjacent DNR marsh in FY 86, the unit could be pumped down providing for active water level control. Such pumping to lower levels may be done if funds are available for electric costs and a agreement is reached with the State.

1. Unit Pool 2a
2. Acres 70
3. Maximum elevation permissible 570 (572)
4. Flowline elevation of lowest structure 569
5. Elevation of general pool bottom 568
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 5

Species	%1984	%1985	%19__
Open water	94	87	
Wooded	5	5	
Mixed forbes	0	2	
Smartweed, velvet leaf	0	5	
Aquatic smartweed	1	1	

8. Wildlife Use:

	Use Days 1984	1985	19__
Geese	3000	3000	
Duck	1500	1500	
Great blue heron	200	300	

9. Map: See Appendix

10. Purple loosestrife: First year plants pulled on highest area.

Pool 2a

A.2 Effects of Past Year's Water Levels

Levels: Water levels rose from 569.5 to 570.3 during the spring but were then lowered during April by pumping in Pool 2b. No water was added during the summer and evaporation losses further lowered levels as low as 569.5 by October 1st. No water was added during the fall.

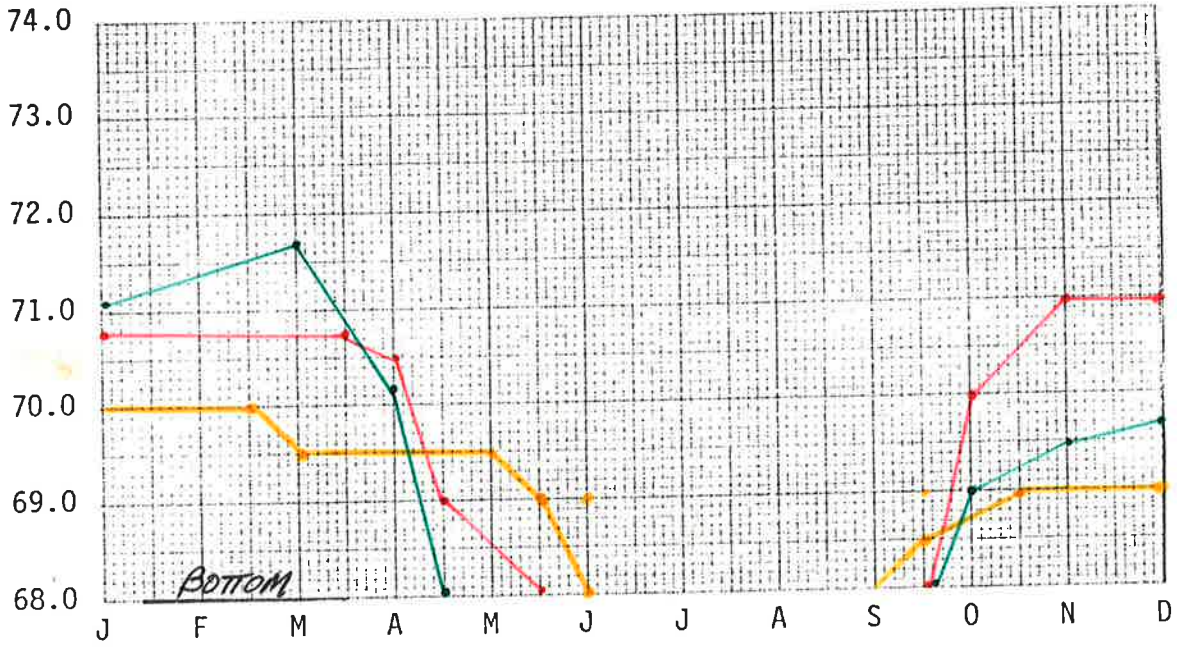
Results: Vegetation response in this unit to a partial drawdown was poor and the unit is primarily open water. Water levels were not lowered sufficiently during the summer to significantly improve vegetation. Goose, shorebird, tern, and gull use was high in the fall on the exposed mudflats.

Facilities: This unit has relatively new dikes in good condition, but the north dike is suffering some erosion on the interior edge. Rip-rap and some resloping is needed to prevent further damage. A complete drawdown is needed to re-vegetate the unit.

B.2 Objectives of the 1986 Proposed Water Levels

Complete dewatering of this unit in 1986 to re-establish vegetation and repair the dike edges. Rip-rap will be added to interior slope. The unit will be pumped dry as early as possible in the spring and left dry throughout the summer. In the fall, it will be reflooded only to 568.5. As much as 18" of water is gained over winter and high water in early spring causes severe dike erosion.

1. Unit Pool 2b
2. Acres 95
3. Maximum elevation permissible 572.0
4. Flowline elevation of lowest structure 570.0
5. Elevation of general pool bottom 568.0
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 1

Species	%1984	%1985	%19__
Cattail	1	1	
Willow/wooded	8	8	
Smartweed/millet	6	62	
Open Water	85	8	
Smartweed/cottwood seedlings	0	21	

8. Wildlife Use:

	Use Days 1986	1985	19__
Geese	2000	35000	
Ducks	2000	60000	
Great blue heron	100	15000	

9. Map:

10. Purple Loosestrife: None noted.

Pool 2b

A.2 Effects of Past Year's Water Levels

Levels: Water levels in Pool 2b were lowered by pumping in March and April, with the unit being almost dry by May 1st. A portion of the deepest area in the center was left with a few inches of water that could not be pumped off. This lower bay dried up by early June and was heavily invaded by cottonwood seedlings. Major repair work was done to the dikes and the area reflooded during mid-October.

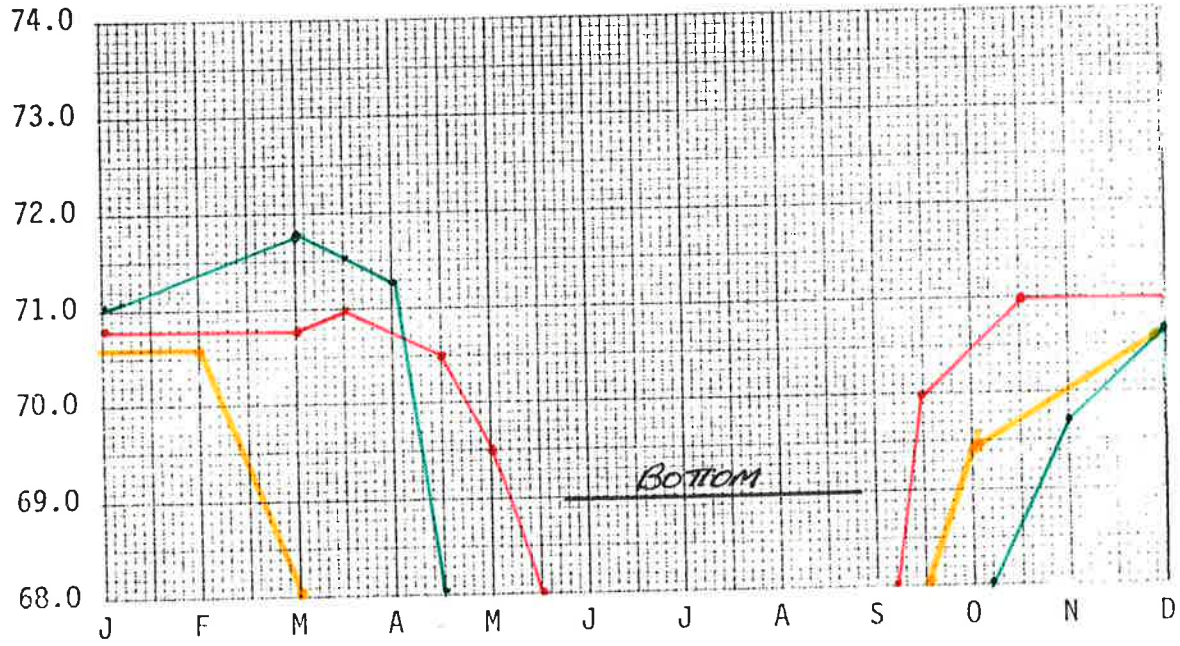
Results: The entire bottom was covered with smartweed, velvetleaf, millet, nutsedge and cottonwood. The cottonwood was mowed just prior to flooding. During the drawdown the area received very heavy use by wading birds, especially great blue herons,egrets and shorebirds. After flooding, waterfowl use was excellent.

Facilities: The repair work done in 1985 has put the interior dikes of this unit in good condition and the scheduled purchase of rip-rap in 1986 should give them adequate protection against higher water levels. all water removed from this unit was done by pumping as lake levels prevented any natural drainage. Pumping was started in late March using a tractor powered, 16" Crisafulli pump. Approximately 21 days at 24 hours per day were expended pumping this unit for a estimated cost of $4,000 for fuel, tractor and pump repair. Staff time required to do complete the drawdown was 84 hours.

B.2 Objectives of the 1986 Proposed Water Levels

To attempt to encourage emergent marsh vegetation, this unit will be partially dewatered during the spring period and kept as moist as possible during the summer. The area will be reflooded only to the point of covering the highest points in the unit and kept below a level where dike damage may occur to any still unprotected dikes.

1. Unit Pool 2c
2. Acres 80
3. Maximum elevation permissible 571 (573)
4. Flowline elevation of lowest structure 567
5. Elevation of general pool bottom 569
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 1

Species	%1984	%1985	%19__
Aquatic smartweed	3	3	
Smartweed/cottonwood seedling	0	19	
Smartweed	0	75	
Open Water	97	3	

8. Wildlife Use:

	Use Days 1984	1985	19__
Geese	1500	15000	
Ducks	1500	30000	
Great blue heron	200	20000	

9. Map: See Appendix.

10. Purple loosestrife: None noted.

Pool 2c

A.2 Effects of Past Year's Water Levels

Levels: Water levels in Pool 2c were lowered by pumping in March and April. The unit was dry by May 1st, except for a area in the north central portion. A portion of the deepest area in the center was left with a few inches of water that could not be pumped off. This dried up by early June and was heavily invaded by cottonwood, which was mowed later in the year. Major repair work was done to the dikes and the area reflooded during mid-October.

Results: The drawdown allowed vegetation of millet, smartweed, and other annuals to grow over the entire unit. An bay area in the center was predominately cottonwood. The cottonwood was mowed just prior to flooding. During the drawdown the area received heavy use by wading birds, especially great blue herons and egrets. After flooding, waterfowl use was excellent. Vegetation in this unit responded and was managed identical to Pool 2b. Some dike repair was accomplished but not completed. The area was reflooded in late November to allow waterfowl use of the moist soil plant seeds.

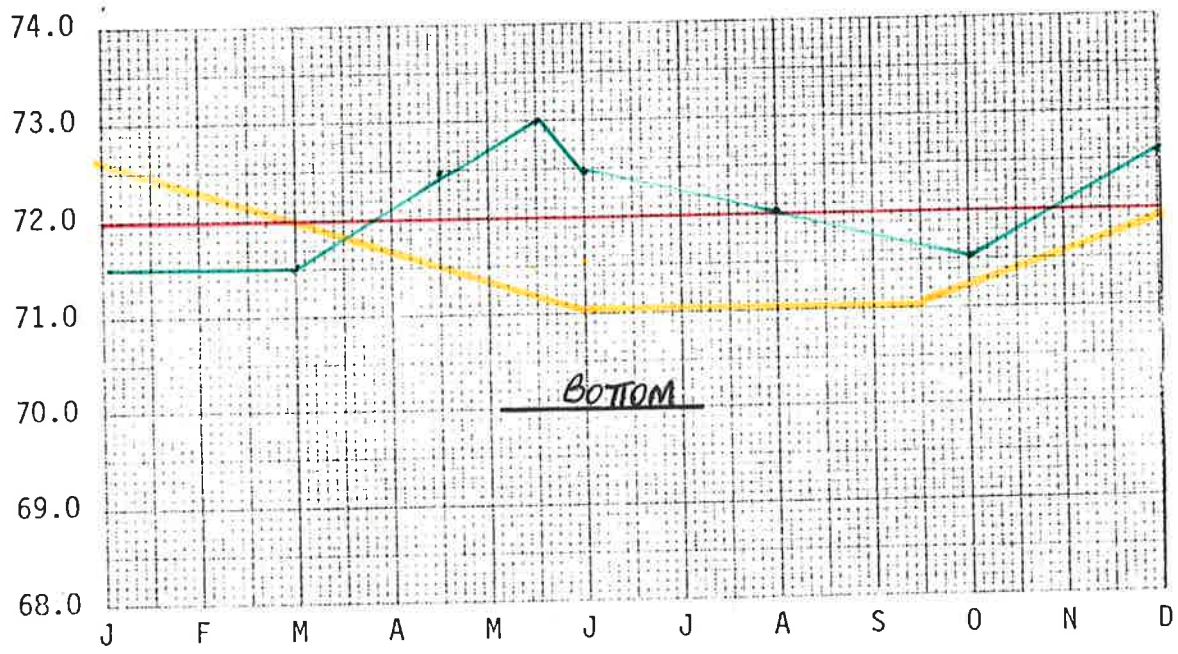
Facilities: The north dike was largely rebuilt on the east end and in the center portion and the south dike was rebuilt along a portion of the east end. However, approximately 2/3 of the south dike and all of the east dike are still severly eroded, and some eroded areas remain on the north and west dikes. These will be repaired in the summer of 1986 as soon as conditions are dry enough for working. Rip-rap will be placed on all repaired dikes.

Costs: All water removed from this unit was done by pumping as lake levels prevented any natural drainage. Pumping was started in late March using a tractor powered, 16" Crisafulli pump. Approximately 10 days at 24 hours per day were recorded with a estimated cost of $1,900 for fuel and equipment repair, and 40 staff hours. Approximately the first 1½ feet of water from this unit was pumped from Pool 2b.

B.2 Objectives of the 1986 Proposed Water Levels

This unit will again be completely dewatered as soon as possible in the spring. Plans are to start pumping as soon as daytime temperatures reach above freezing on a regular basis and the pump sites become ice-free. Crisafulli pumps will be used to completely dewater the area. While dry, dike repair will continue and the eroded dikes will be rebuilt and rip-rapped as necessary to prevent further damage. Water will be added in the fall only to the point of just covering the highest elevations and held below any level where still unprotected dikes will be damaged.

1. Unit Pool 6
2. Acres 160
3. Maximum elevation permissible 573.0
4. Flowline elevation of lowest structure 569.0
5. Elevation of general pool bottom 570.0
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 3

Species	%1984	%1985	%19__
Open water	40	45	
Wooded	10	10	
Cattail	50	45	

8. Wildlife Use:

	Use Days 19__	19__	19__
Unknown			

9. Map: Photos taken - no maps developed.

10. Purple loosestrife: None observed.

Pool 6 (Woodie's Roost)

A.2 Effects of Past Year's Water Levels

Levels: Water levels were kept as stable as possible during the year by letting in water when lake levels permitted. The lack of automatic flow structures into this unit severly hampers the management of the unit as all water flow must be closely monitored and twice daily adjustments made to the structure setting. In addition, breaks and rat holes in dikes do not allow for precise management.

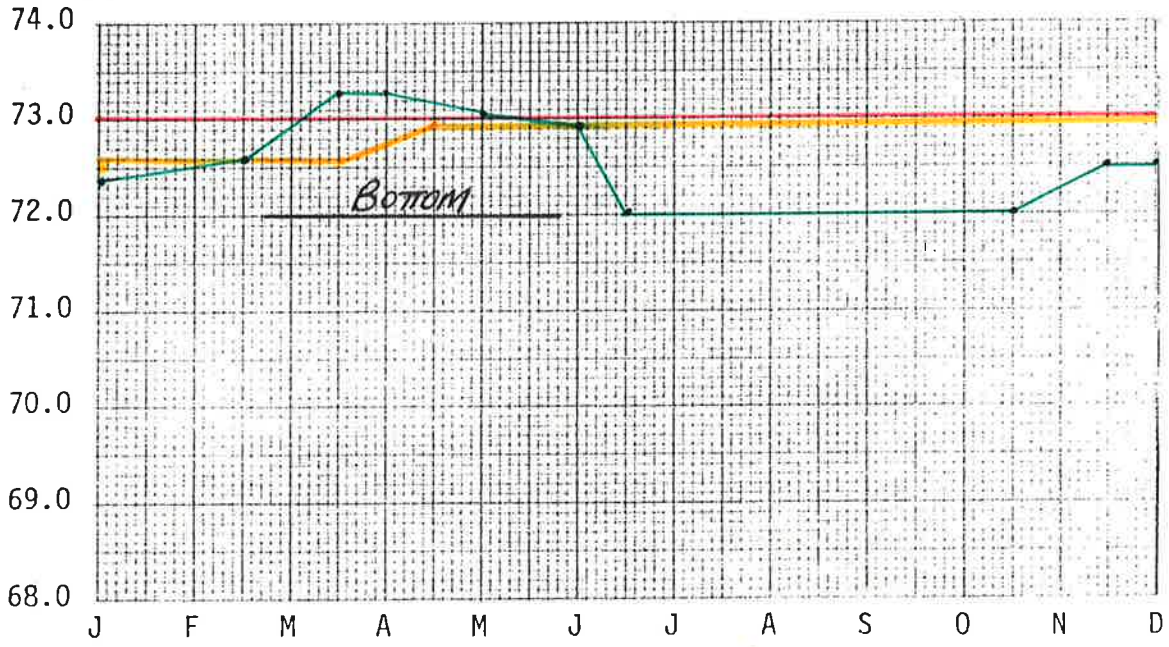
Results: Muskrats took advantage of the increased water levels and opened up dense cattail areas. There was a 10 fold increase in rat houses noted.

Facilities: A detailed evaluation of the condition of the dikes has not yet been done. Some erosion of the north dike is a problem.

B.2 Objectives of the 1986 Proposed Water Levels

Water will be held stable in this unit during the year. The degree of management will depend on the degree that the dikes will hold water. Dike repairs for Pool 6 are not possible in 1986. Water levels in this unit depends upon water levels in the adjacent state wildlife area as water must come through the state area. Currently, the state must raise the level of their canal before we can take on water.

1. Unit Show Pool
2. Acres 30
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 569
5. Elevation of general pool bottom 572
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 5

Species	%1984	%1985	%19__
Water	16	16	
Cattail	10	10	
Wet Meadow	64	64	
Cottonwood	10	10	

8. Wildlife Use:

	Use Days 1984	1985	19__
Geese	3000	3000	
Ducks	1000	1000	
Great blue herons	500	500	

9. Map: See Appendix.

10. Purple loosestrife: Large numbers of first year plants noted in NE&E portion of the unit. Sprayed and mowed.

Show Pool

A.2 Effects of Past Year's Water Levels

Levels: After the spring runoff periods, this pool was reduced to approximately 572.0 by pumping and held there during the summer. It was lowered contrary to the plan to permit mowing. In September, it was raised to approximately 572.5 by natural runoff and remained there the remainder of the year.

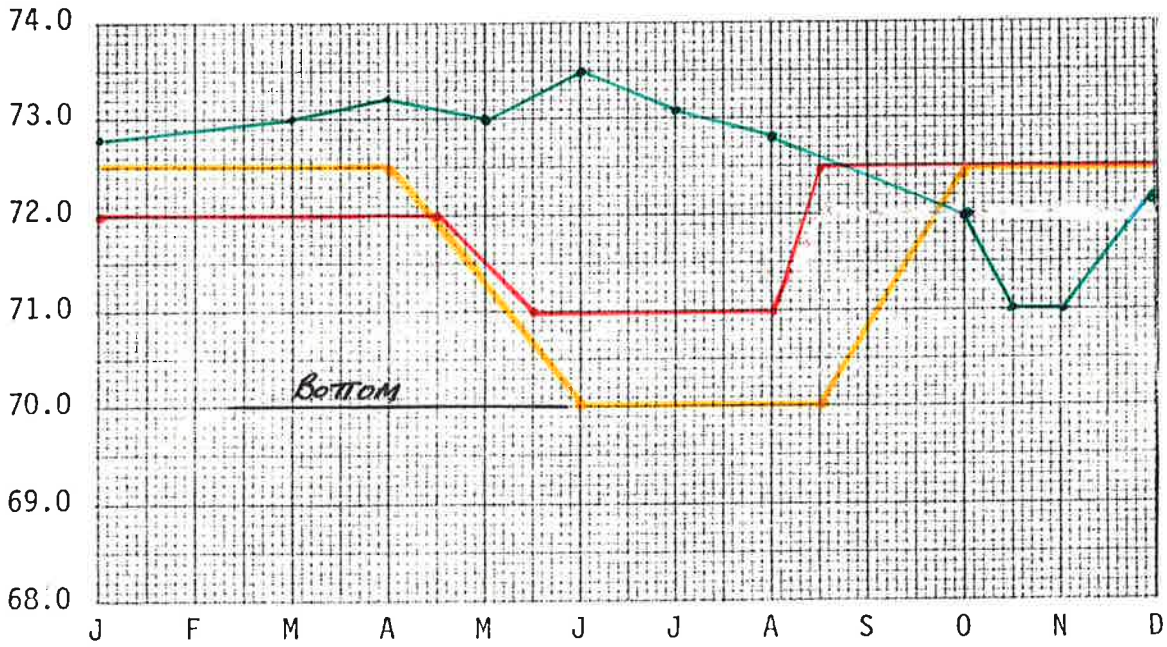
Results: This pool consists of a considerable amount of high ground and some borrow pits of deeper water. Little aquatic vegetation change was noted during the year. However, much of the higher elevations are becoming invaded with woody vegetation.

Facilities: Control of the woody vegetation is needed. A flapgate is needed on a drain culvert leading from the office woods before substantially higher water levels can be held. The north and east dike have erosion problems in a few areas.

B.2 Objectives of the 1986 Proposed Water Levels

Water levels will be held high and stable for the year to control cottonwood saplings. Because of the small area of actual marsh, little management time will be spent in manulipation of the water levels within this unit.

1. Unit Headquarters Pool
2. Acres 30
3. Maximum elevation permissible 572.5
4. Flowline elevation of lowest structure 570
5. Elevation of general pool bottom 570
6. Water levels: 85 Planned —, 85 Actual —; 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 3

Species	%19 84	%19 85	%19
Open Water	33	33	
Cattail	33	33	
Wet Meadow	34	34	

8. Wildlife Use:

	Use Days 19 84	19 85	19
Geese	20000	20000	
Ducks	4000	4000	
Great blue herons	2500	2500	

9. Map: Photos taken, map not developed.

10. Purple loosestrife: Scattered plants all along eastern edge of wetland, sprayed in August.

Headquarters Pool

A.2 Effects of Past Year's Water Levels

Levels: Two breaks in the north dike occurred as a result of the spring high water levels and water levels fluctuated with lake elevations. The breaks were repaired in mid-June and levels held at approximately 572.0 until October 15 when lower lake levels allowed gravity drainage. The area was held low for only a few weeks before being allowed to refill.

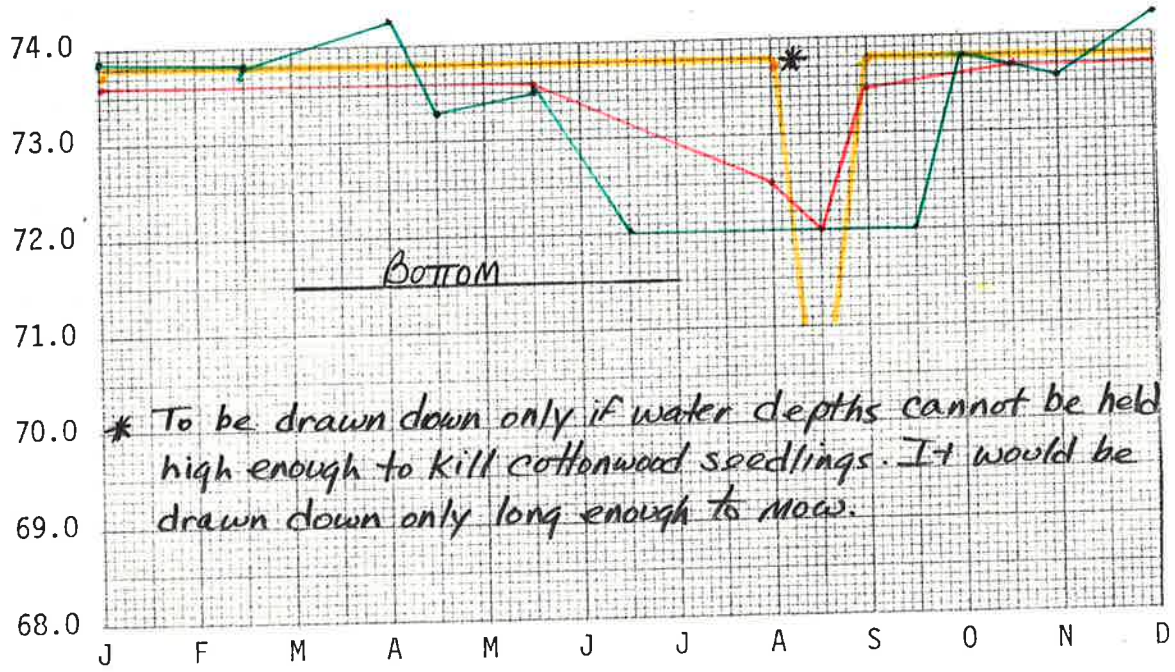
Results: This pool contains little submergent vegetation in the open water areas and a scattering of emergent vegetation along the eastern and southern edges. Little change was noted during the year.

Facilities: The south dike of this unit is in poor condition and in need of re-sloping and rip-rapping. Some rip-rap is also needed along the entrance road to curtail erosion. The water control flapgate is also leaking.

B.2 Objectives of the 1986 Proposed Water Levels

Drawdown in May will be accomplished with a Crisafulli pump. The north dike and flapgate will be repaired. A excellent smartweed response is expected.

1. Unit MS-3
2. Acres 213
3. Maximum elevation permissible 574.5 (573.5)
4. Flowline elevation of lowest structure 567
5. Elevation of general pool bottom 571.5
6. Water levels: 85 Planned —, 85 Actual , 86 Planned .



7. Vegetation: Marsh Successional Stage(1-5) 2

Species	%1984	%1985	%19__
Emergents	25	30	
Open Water	15	10	
Smartweed/millet	25	5	
Other marsh emergents	10	15	
Bidens	25	40	

8. Wildlife Use:

	Use Days 1984	1985	19__
Geese	200000	225000	
Duck	800000	650000	
Great blue heron	6000	4000	

9. Map: See Appendix.

10. Purple loosestrife: First year small plants showing up throughout the unit. Impossible to reasonably locate to spray.

MS-3

A.2 Effects of Past Year's Water Levels

Levels: Water was held in MS-3 during the entire year. Water was near 574.0 until mid-April and then dropped slowly during the spring and summer, reaching 572.3 by October 1st. Water was added by pumping during July and in October. End of year levels were at 574.30. Water overtopped the north dike on two occasions during the spring and several muskrat holes were patched during the spring and fall months.

Results: Moist soil plant response was excellent on the unit. Cottonwood seedlings were noted over a large area and small purple loosestrife plants were common. The unit also has a considerable amount of cattail which is expanding. The unit received excellent duck use during the late summer and during the entire fall.

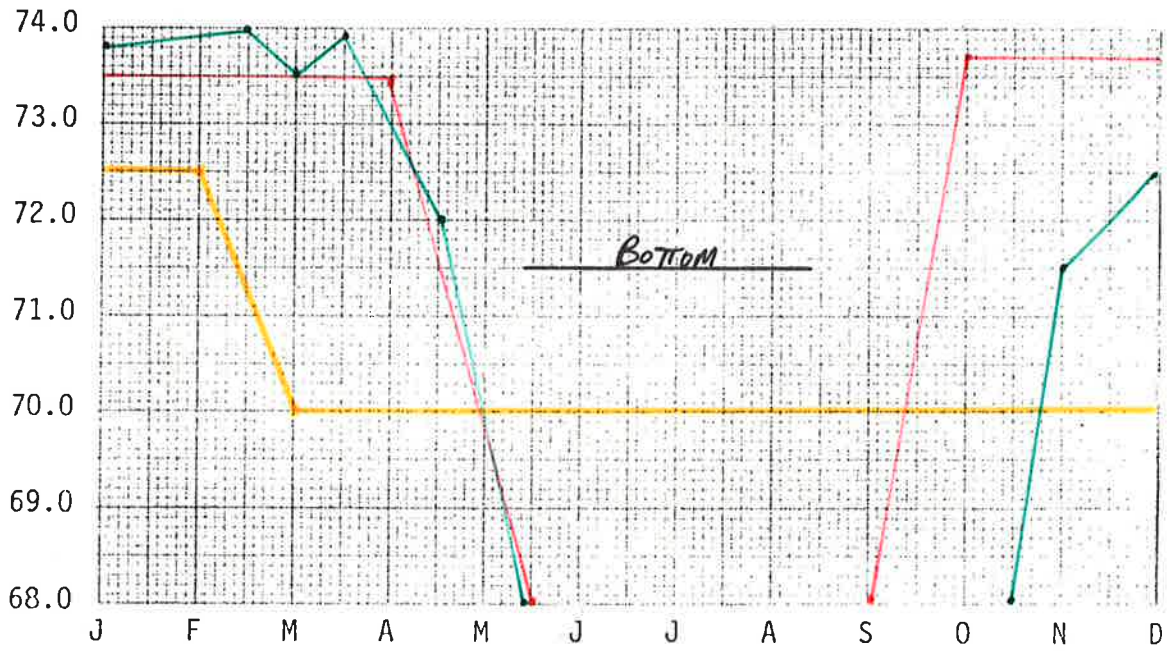
Facilities: The north dike of this unit is currently to low to exclude spring high water levels and frequent overtopping is expected. Even more serious is the erosion that is occurring on the Tank Ditch side of this dike. This erosion will result in failure within the next 2-4 years. The south dike, built in 1979-80, was constructed without removing the underlying drainage tiles and with steep slopes on the exterior side (in main pump ditch). This has resulted in slughing of the dike into the ditch. These areas need to be resloped and the underlying tiles removed. The north Tank Ditch dike will not hold water levels to the point of providing good cottonwood control.

Costs: Pumping was limited to the refilling of the unit during July and again in September/October. Approximately 40 hours of pumping at a cost of $1,000 was done using the moist soil unit electric pump.

B.2 Objectives of the 1986 Proposed Water Levels

Because of plans to de-water MS-4 and 5 for farming water will be maintained as high as possible in MSU-3. Water will be held at a level of 573.50 and to 574.00 during the spring and early summer. This level is expected to hold water over most of the areas and discourage growth of cottonwoods. The areas will be drained quickly in late summer (August) if other work scheduling and manpower will allow mowing, spraying, or other mechanical vegetation control. The entire unit will be reflooded after mowing is completed.

1. Unit MS-4
2. Acres 106
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 567
5. Elevation of general pool bottom 571.5
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 2

Species	%1984	%1985	%19__
Borrow area	0	3	
Reed canarygrass/willow	60	65	
Cattail/willow	15	20	
Millet/bidens/smartweed	25	15	

8. Wildlife Use:

	Use Days 1984	1985	19__
Geese	20000	25000	
Ducks	15000	20000	
Great blue heron	500	500	

9. Map: See Appendix.

10. Purple loosestrife: First year plants scattered over south end. Too hard to locate for spraying.

A.2 Effects of Past Year's Water Levels

Levels: Water was held at 573.8 to 574.00 until mid-April. Beginning in May, water was removed from this unit by using the main moist soil pump. The unit was dry by May 15th. The area was reflooded beginning November 1st. to an elevation of 572.8. During the summer, the north dike of this unit was rebuilt completely and rip-rapped on the outside.

Results: The response by moist soil plants, millet and smartweed, was excellent in any areas where cattails were disked and sprayed during the previous year. However, significant brush and reed canarygrass expansion occured over much of the area. The millet received heavy goose use before flooding and waterfowl use was moderate after the flooding. Four mallard nests were located by volunteers during a foot search of the unit.

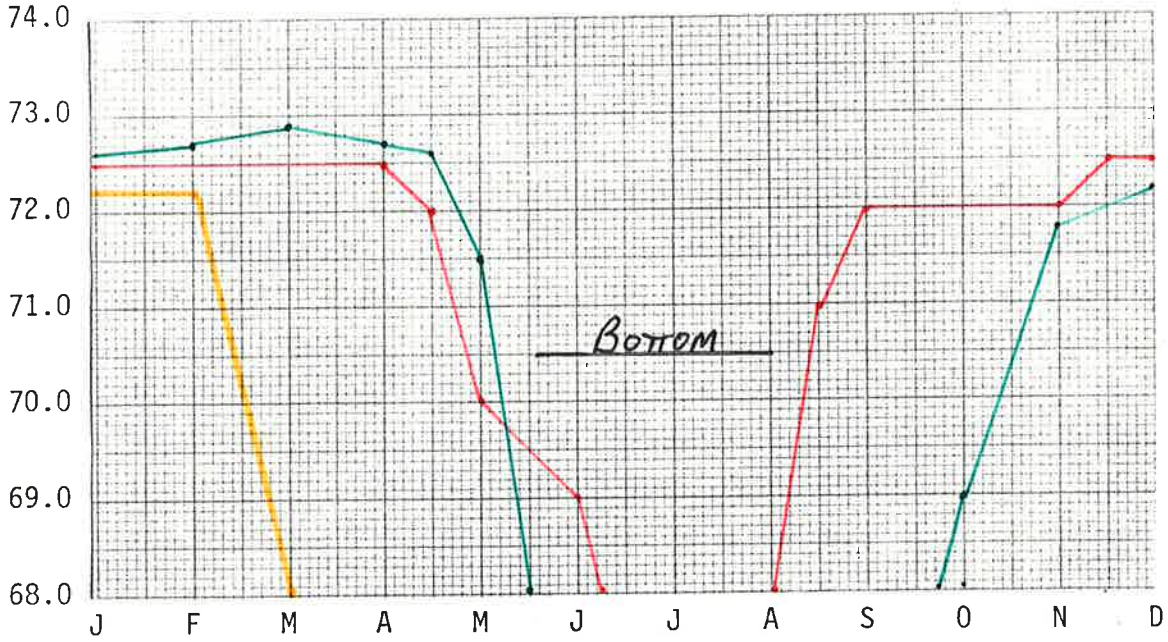
Facilities: With the rebuilding of the north dike, this unit is in good condition. However, water levels should be kept low in the unit next year to allow vegetation to restablish on the new dike. The east dike is in fair shape, but is suffering some erosion which should be repaired within the next 3-5 years.

Costs: An estimated $300 was spent on electricty to de-water the unit.

B.2 Objectives of the 1986 Proposed Water Levels

Elemination of the woody/cattail/reed canarygrass growth is the goal for the year. The unit will be drawndown in March, burned and/or mowed, plowed, disked and planted to buckwheat in July or August. Areas that still contain sprouts of any of the three problem species will again be either plowed or disked in September or October. No water will be added in the fall and the vegetation response in 1987 should be excellent.

1. Unit MS-5
2. Acres 250
3. Maximum elevation permissible 573.
4. Flowline elevation of lowest structure 567.
5. Elevation of general pool bottom 570.5
6. Water levels: 84 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 1

Species	%19 84	%19 85	%19
Smartweed/millet	10	10	
Millet	45	0	
Beggars tick/millet	5	45	
Cattail/reed canarygrass	5	5	
Cottonwood/willow	35	35	

8. Wildlife Use:

	Use Days 19 84	19 85	19
Geese	150000	240000	
Ducks	250000	450000	
Great blue heron	1000	2500	

9. Map: See Appendix.

10. Purple loosestrife: None noted, first year plants probably present.

MS-5

A.2 Effects of Past Year's Water Levels

Levels: Water levels were held at 572.5 to 572.90 through the spring period. Beginning in May, water was removed from this unit by using the main moist soil pump. The unit was dry by June 1st. During July and August, major areas of woody vegetation were mowed. The entire north dike was rebuilt and rip-rapped on the Tank Ditch side. The area was reflooded in late October to an elevation of 571.0 and further raised during November to 572.40 at years end.

Results: The objectives of removal of the woody growth by mechanical means were met and the response by moist soil plants was good, although not as good as 1984. Good stands of millet and bidens grew in the mowed areas. Mowing of overtopping trees released the understory species. The millet received heavy goose use before flooding and mallard and black duck use averaged 5,000 to 10,000 ducks per day during November and early December.

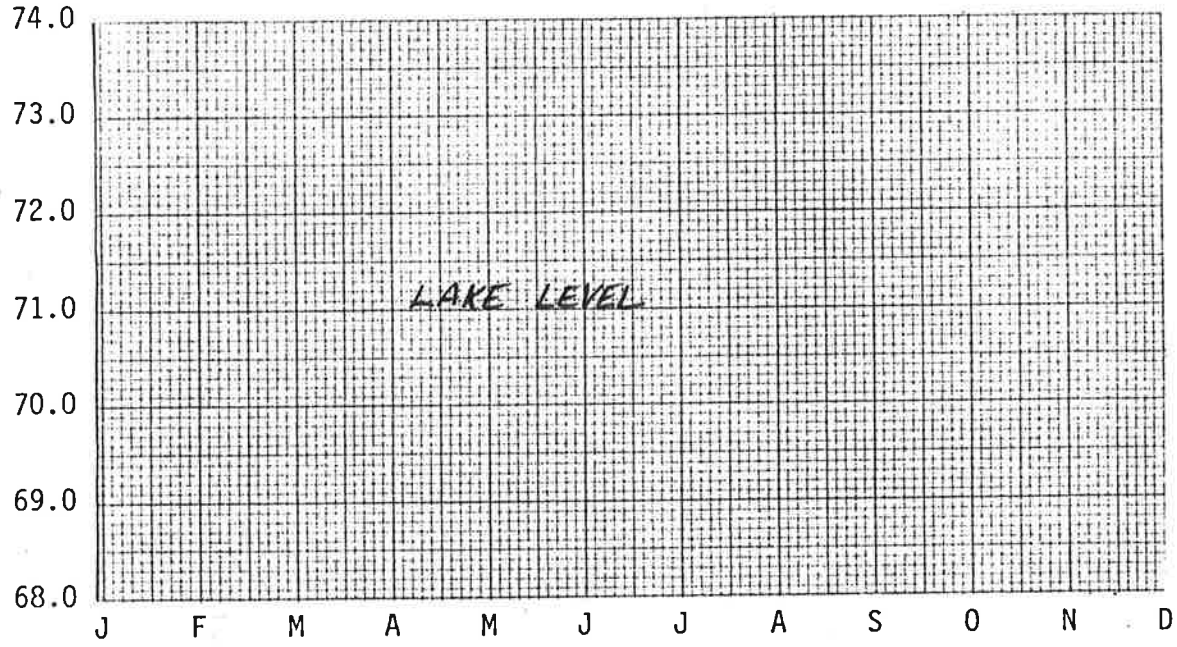
Facilities: The interior of the new Tank Ditch dike needs to have top-soil added and the slope reseeded. This will be done early in 1986.

Costs: Pumping was done during late April and May. All pumping was done with the moist soil pump. Costs to de-water were approximately $600.

B.2 Objectives of the 1985 Proposed Water Levels

During 1986, this unit will be tilled to the maximum extent possible through the use of cooperative farming agreements. It is hoped that at least 75% of the area can be put into crops and the remaining flooded. Fall flooding will depend upon the type of crops, time of harvest, and plans for the following year. A 2-year coop farming agreement may be neccessary. If woody sprouts are still a problem they may be plowed or disked in late fall after the crops are removed. The objective is to end the current woody problem this year.

1. Unit MS-6
2. Acres 70
3. Maximum elevation permissible Varies with lake
4. Flowline elevation of lowest structure None
5. Elevation of general pool bottom 571.5
6. Water levels: 85 Planned , 85 Actual , 86 Planned



7. Vegetation: Marsh Successional Stage(1-5) 2

Species	%19 84	%19 85	%19
Cottonwood/willow	35	35	
Other upland	10	10	
Cattail	50	50	
Other emergent	5	5	

8. Wildlife Use:

	Use Days 19 84	19 85	19
Duck	1000	1000	
Geese	100	100	

9. Map: Photos taken - no map developed.

10. Purple loosestrife: None noted.

MS-6

A.2 Effects of Past Year's Water Levels

Levels: No actual water control was done in this unit due to the damaged dikes in the unit which prevent the holding of water levels. Both the north and south dikes of the unit have large muskrat holes and other breaks that allow the water to flucuate with lake levels.

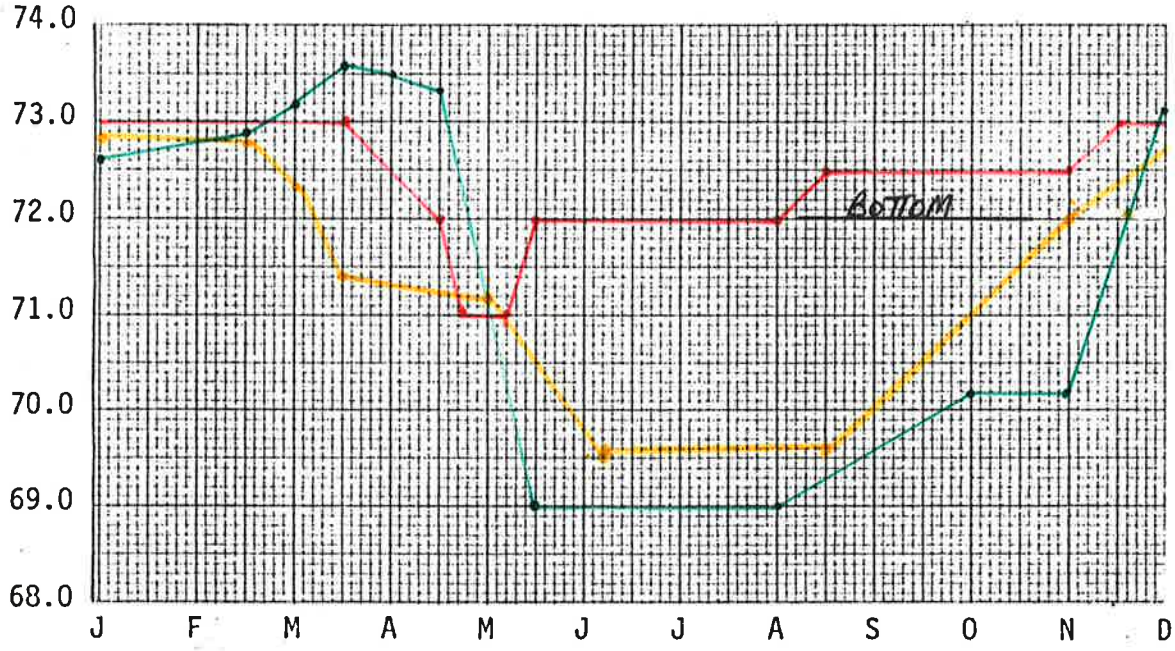
Results: This unit was almost 100% vegetated with heavy cattail and/or willow and cottonwood due to lack of water control and lack of management since it was removed from agricultural production several years ago. Waterfowl use was low.

Facilities: Both the north and south dikes need complete rebuilding to make this a functional unit. Minor extension of inlet/outlet culverts to the moist soil pump are needed. Screwgates and culvert bases are already installed. Active water level control is present if the dikes are repaired.

B.2 Objectives of the 1985 Proposed Water Levels

If work scheduling and manpower permit, the water levels will be held as low as possible during 1985 and attempts will be made to de-water the entire unit by pumping in order to make repairs to the damaged dikes. If the south dike has no more major holes, the north dike can be repaired by plugging the adjacent ditch and pumping the unit dry. The north dike will be repaired using a small bulldozer to build up the side slope for the entire length. If possible, major repairs will also be made to the south dike if the water can be completely removed. Cattail and brush control could be done by chemical and mechanical means.

1. Unit MS7-A
2. Acres 49
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 570.5
5. Elevation of general pool bottom 572.0
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 1

Species	%1984	%1985	%19__
Upland species	55	40	
Cattail	103	5	
Millet	10	10	
Beggar tick, velvet leaf	20	40	
Smartweed	5	5	

8. Wildlife Use:

	Use Days 1984	1985	19__
Ducks	20000	15000	
Geese	15000	10000	
Great blue herons	1000	1500	

9. Map: See Appendix.

10. Purple loosestrife: Only one plant noted - sprayed.

A.2 Effects of Past Year's Water Levels

Levels: Water levels in MS-7A were held high to completely flood the unit until mid-May and then slowly drawn down until late June. The unit was dried as completely as possible to allow dike work in unit 7B which is connected via a damaged dike. A small amount of water was held in the ditch. Problems in de-watering the unit with the permanent pump were experienced due to siltation of the pump.

Results: Vegetation consisted primarily of beggars tick, millet, small amounts of Carex and some cattail. Shorebird use was excellent in May and June with large flocks of sandpipers and dunlins observed. Duck use was excellent in April and May. Even though almost dry approximately 500 mallards were observed in the unit each day during July and August. During June, much of the area was given a light discing to encourage millet, which worked.

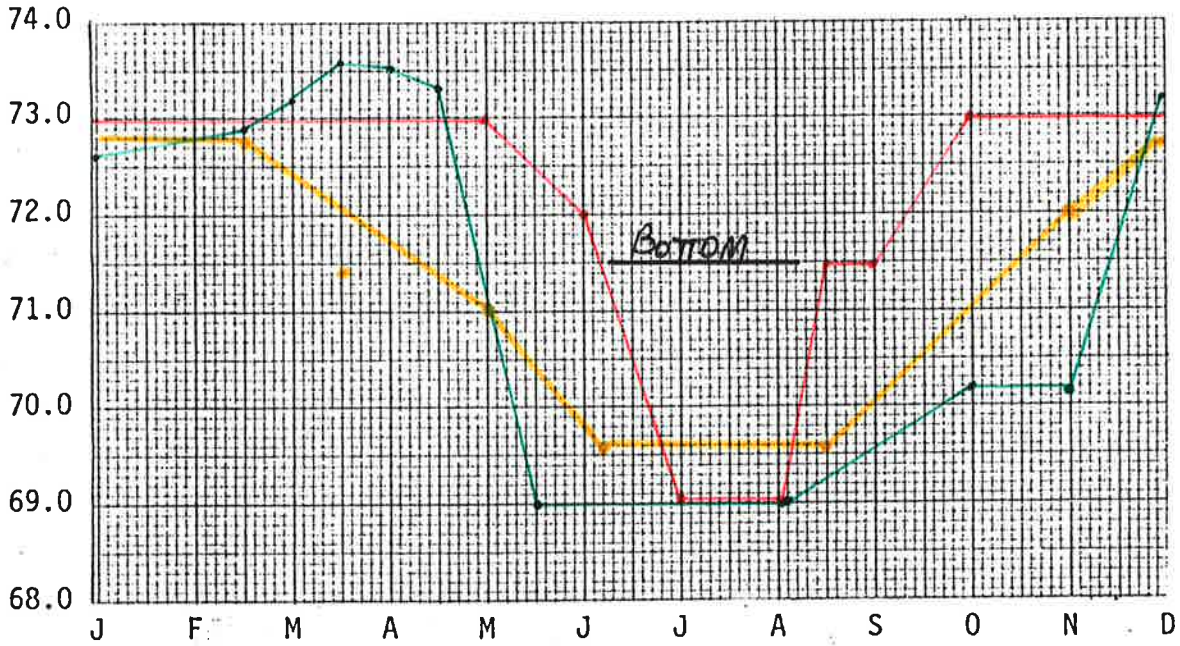
Facilities: The exterior dike of this unit is in relatively good condition, except that the dike slopes are steep and eroding. Resloping and rip-rapping is needed to prevent additional deterioration. The dike between this unit and 7B needs rebuilding to give additional height and allow separate operation of the two units. The pump ditch area needs major cleaning to remove silt from around the pump well.

Costs: This unit was pumped dry using a 8" electric pump at a approximate cost of $300 (electricity only). This involved considerable staff time because of pump siltation problems.

B.2 Objectives of the 1985 Proposed Water Levels

Water levels will again be held (573+) until early May and then de-watered as quickly as possible. The unit may be tilled by refuge personal if cocklebur and cattail are a problem. The dike between the units will be repaired if time permits. The pump area will be cleaned of silt and the pump repaired.

1. Unit MS-7B
2. Acres 44
3. Maximum elevation permissible 573. (572.)
4. Flowline elevation of lowest structure None
5. Elevation of general pool bottom 571.5
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 1

Species	%1984	%1985	%19__
Upland	34	27	
Aquatic smartweed	11	11	
Smart/miller	11	11	
Velvet leaf/beggar tick	34	14	
Agricultural Crop	0	27	
Cottonwood/willow	10	10	

8. Wildlife Use:

	Use Days 1984	1985	19__
Ducks	20000	12000	
Geese	20000	20000	
Great blue herons	1000	1000	

9. Map: See Appendix.

10. Purple loosestrife: None noted.

MS-7B

A.2 Effects of Past Year's Water Levels

Levels: Water levels were held high until mid-May and then lowered as much as possible with the pumping in unit 7A. Final pumping was done with the Ford 8" pump to completely de-water the unit. However, some water collected due to rainwater through the summer. Spring flood waters nearly overtopped this exterior dike in April and the high water and waves severly eroded the dike to the point where it was less than one foot wide on top with nearly vertical slopes. Some repair work was done in the late fall.

Results: In general, vegetation on the exposed areas which had been exposed in the previous years was predominately beggar's tick, and the areas which were not exposed the previous year were smartweed or millet. Much of the beggar's tick area was tilled and planted to proso millet under a cooperative agreement. However, no fertilizer was used and both vegetative growth and seed production of the millet was very poor.

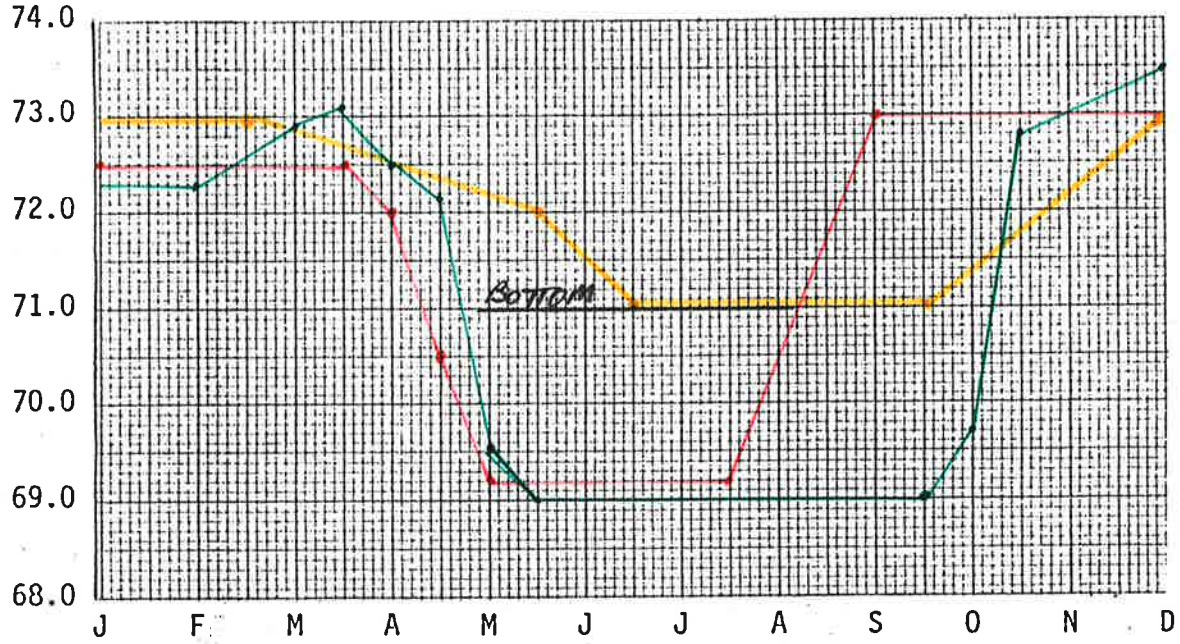
Facilities: Additional repair work is needed on both the exterior north dike and the west dike which separates the unit from unit 7A. A gravity water control structure is needed to allow drainage and filling.

Costs: The first portion of the unit was pumped off through unit 7A as water ran over or through the damaged dike. The remaining water was pumped using the Ford industrial pump. Approximately 40 hours were used with the Ford pump. Cost estimate of $200 in fuel.

B.2 Objectives of the 1985 Proposed Water Levels

This unit will again be dried up as much as possible in order to finish repair of these dikes. Early de-watering is planned to encourage growth of smartweed on the area tilled during 1985. Planned work includes repair of both dikes and installation of a screwgate and culvert between unit 7A and 7B.

1. Unit MS-8A
2. Acres 47
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 569.
5. Elevation of general pool bottom 571.0
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 1

Species	%1984	%1985	%19__
Agricultural	0	64	
Millet/smartweed	11	26	
Bidens	47	2	
Cottonwood seedlings	32	0	
Upland species	10	0	

8. Wildlife Use:

	Use Days 1984	1985	19__
Geese	30000	40000	
Ducks	80000	100000	
Great Blue Herons	2000	1000	

9. Map: See Appendix.

10. Purple loosestrife: None observed.

MS-8A

A.2 Effects of Past Year's Water Levels

Levels: This unit was dried up completely during May and the unit was tilled with portions being planted to buckwheat, corn, and milo. The wetter areas were not tilled and several areas of small cottonwood growth were plowed in October just prior to flooding.

Results: Prior to tillage the unit was almost 100% beggars tick, except for some higher ground where grasses and upland forbs were predominant and some low mudflat areas. These mudflat areas became good stands of smartweed, but any beggar's tick areas that were not tilled remained as beggar's tick and several showed considerable invasion of cottonwood. Cottonwood control in small ½ acre spots is needed annually. Waterfowl use of the smartweed and planted crops was excellent when flooded.

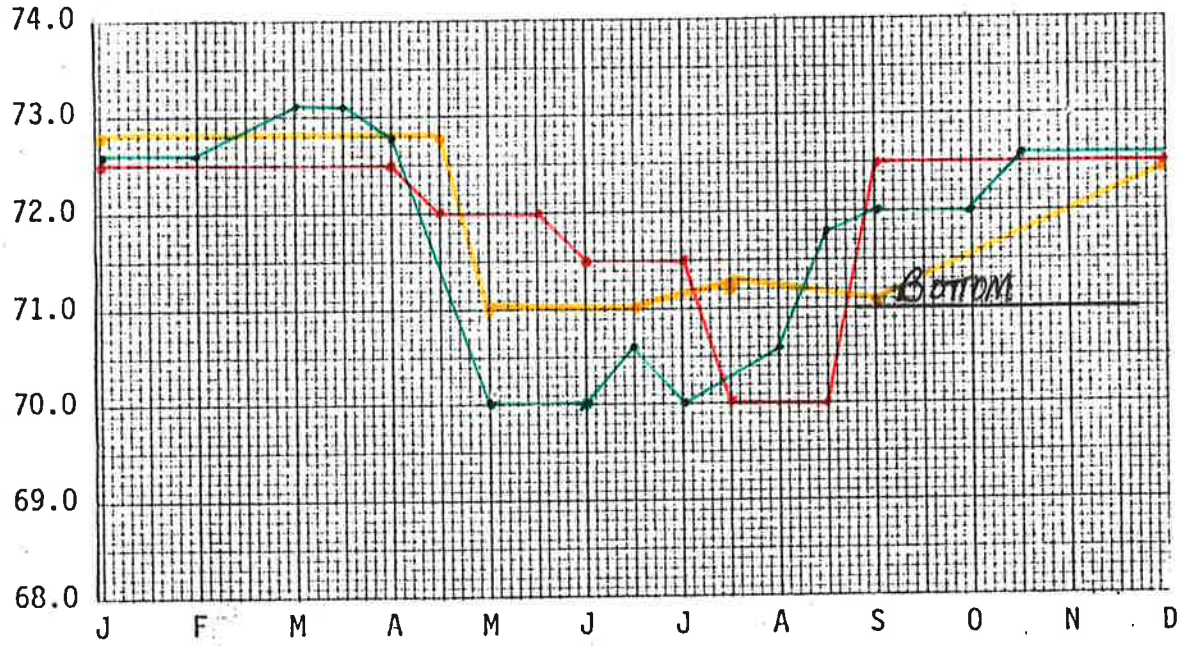
Facilities: The pump unit needs a new housing and other improvements. The SW and W dikes are eroding and in need of repair. The pump well needs to have the silt removed to make the pump more functional.

Costs: Because the main electric pump was silted to the point that it was ineffective, the Ford pump was used to pump down this unit. Approximately 250 hours pump hours were required at a cost of approximately $400 in fuel and 20 hours of staff time.

B.2 Objectives of the 1985 Proposed Water Levels

This area will again be de-watered in the spring (April) and kept in a moist condition for moist soil annuals. It will be reflooded in September or October.

1. Unit MS-8B
2. Acres 85
3. Maximum elevation permissible 572.5
4. Flowline elevation of lowest structure 571.5
5. Elevation of general pool bottom 571.
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 1

Species	%1984	%1985	%19__
Millet	29	76	
Bidens	65	6	
Upland	6	6	
Agricultural Plots	0	12	

8. Wildlife Use:

	Use Days 1984	Use Days 1985	Use Days 19__
Ducks	60000	150000	
Geese	90000	12000	
Great blue herons	2000	3000	

9. Map: See Appendix.

10. Purple loosestrife: None Noted.

MS-8B

A.2 Effects of Past Year's Levels

Levels: Water was removed completely from this unit in April and May. The most of the area was dry by May 1st and the entire unit dry by May 15th. During June, much of the unit was tilled by discing and the low areas of the unit reflooded immediately and allowed to dry some, but kept as moist as possible. Rather than a complete reflooding, water was moved across the unit by allowing water to enter on the high side and flow across in a manner similiar to western flood irrigation techniques. This gave completely saturated soils, but without complete flooding or standing water over most of the area. This wet condition prevailed during late June and early July.

Results: By late May, it was evident that the entire unit would be a solid stand of beggars's tick (Bidens) except for a very small area that was kept flooded the previous year. The discing during June destroyed most of the beggars tick, especially those areas (approximately half) that were disked twice. The area that received two disking revegetated to almost solid common millet and the single disked area became a mixed stand of millet and beggar's tick. However, the millets were not as tall and vigorous as areas where water as been left on for several years (such as Pool 2). Waterfowl use of the areas after fall reflooding was excellent.

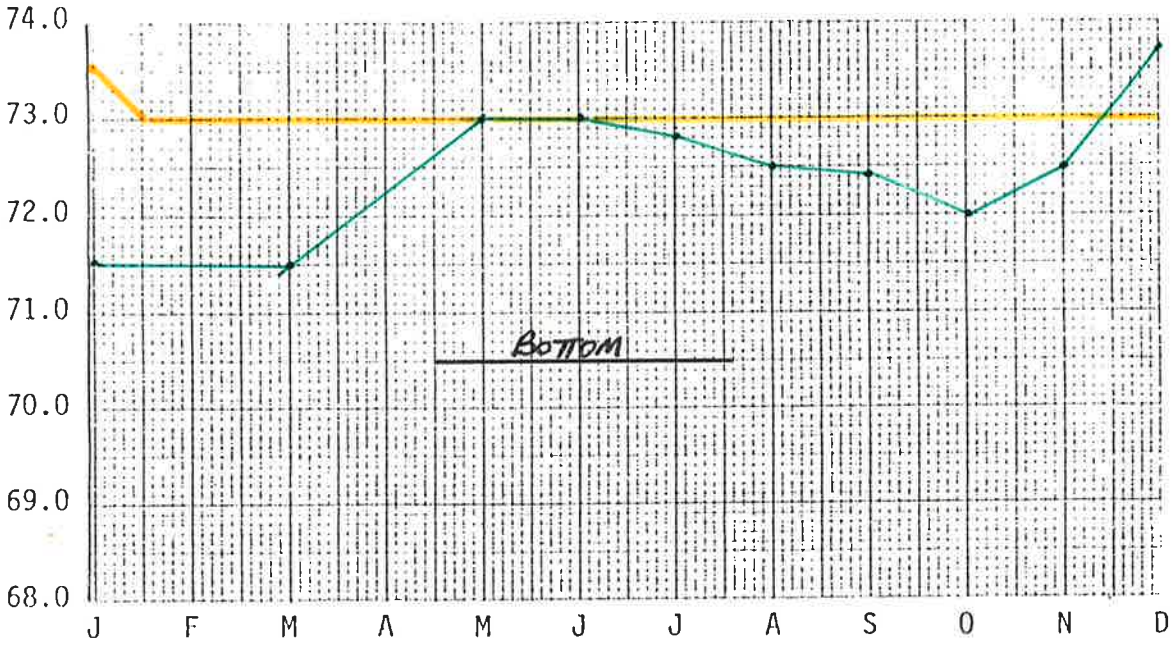
Facilities: In order to allow drainage of the adjacent woodland and prevent long-term damage to this woodland, a culvert and flap-gate in the northwest corner needs to be replaced and the dike on the south side needs minor repair before water levels can be held during the growing season.

Costs: The unit was pumped dry in May using a farm pump at an approximate cost of $300.

B.2 Objectives of the 1985 Proposed Water Levels

Water levels will be held until mid-April. Then the unit will be dewatered and the culvert and dike repair accomplished. Depending on the vegetation that germinates by late May, partial disking and reflooding may be done.

1. Unit Mini-Marsh
2. Acres 16
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 571.0
5. Elevation of general pool bottom 570.5
6. Water levels: 85 Planned NONE, 85 Actual —; 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 3

Species	%1984	%1985	%19__
Open Water	10	10	
Cattail	90	90	

8. Wildlife Use:

	Use Days 1984	1985	19__
Geese	500	500	
Ducks	1,000	1,000	
Great blue herons	400	400	

9. Map: Photos taken - no map developed.

10. Purple loosestrife: None observed.

Mini-Marsh

A.2 Effects of Past Year's Water Levels

Levels: Water was held in the mini-marsh until mid-summer when the pump failed completely, leaving no method of adding water other than portable pumps. Portable pumps were not used due to difficultly in set-up and lack of time. Evaporation losses allowed the unit lower considerably by late summer when a culvert/flap-gate structure was placed through the dike and water was added periodically through the fall. Good water levels were present at the end of the year.

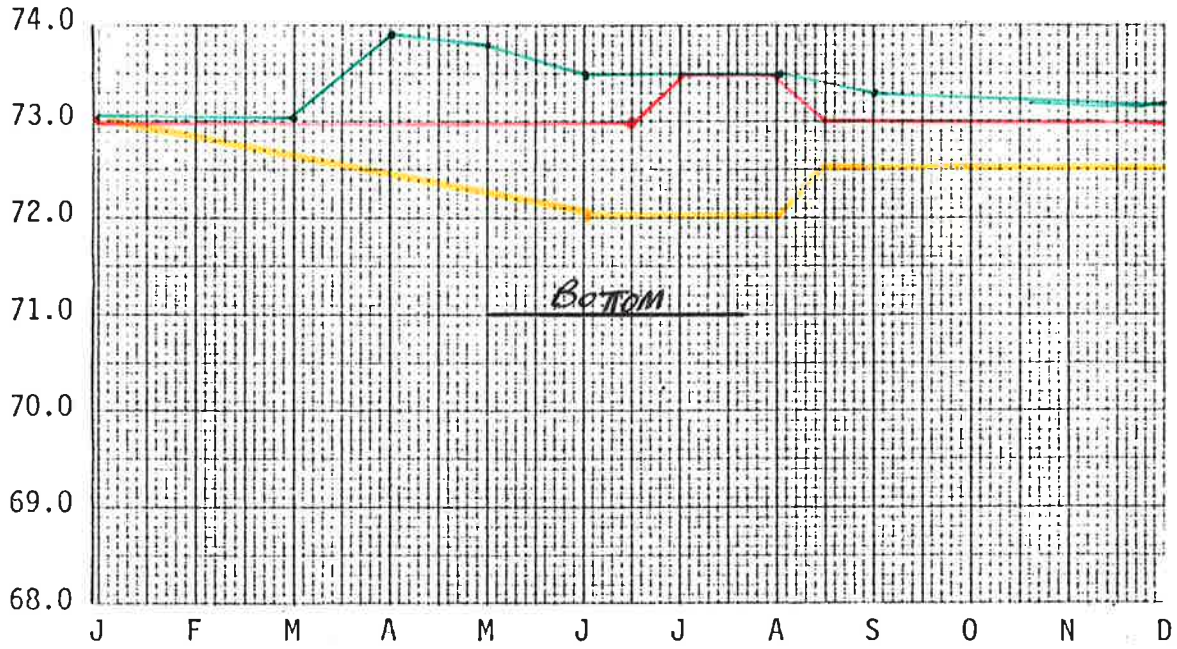
Results: This unit is now almost completely covered with solid cattail. Lack of water had previously reduced the muskrat population which prevented any openings. Higher water levels in the fall resulted in improved muskrat numbers.

Facilities: The dikes around this unit are in fair shape except for the north dike that borders Lake Erie and the east dike along Lindsey-Limestone Ditch which are both severely eroded on the exterior side. Cleaning of the pump near the lodge is needed to allow the addition of water during the summer months.

B.2 Objectives of the 1986 Proposed Water Levels

The lack of pumping facilities will preclude any significant water management of this unit until the Mini-Marsh electric pump can be repaired. Water can be added through the outlet structure during the spring and early summer as long as lake levels remain high. Portable pumping may be used to add water if time permits. If the electric pump for this unit can be repaired, water levels will be held slightly high to encourage cattail control by muskrats.

1. Unit Cedar Point Pool 1
2. Acres 1,460
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 570
5. Elevation of general pool bottom 571
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 4

Species	%1984	%1985	%19__
Open water	25	35	
Water lilly (NUP)	10	15	
Cattail	30	20	
Burreed	15	10	
Other species & species mixes	20	20	

8. Wildlife Use:

	Use Days 1984	Use Days 1985	Use Days 19__
Ducks	700,000	800,000	
Geese	140,000	140,000	
Great blue herons	36,000	30,000	

9. Map: See Appendix.

10. Purple loosestrife: Infestation in western half of pool from scattered plants to small 1/100 acre stands. Sprayed in August. Status stable due to high water.

Cedar Point Pool 1

A.2 Effects of Past Year's Water Levels

Levels: Due to high lake levels gravity drainage did not work and levels held at or above 573.5 all spring through mid-August. At near 3 feet above the general pool bottom hundreds of acres of emergents drowned.

Results: The wide variety of emergents and interspersion in Pool 1 is decreasing. Cattail, burreed and rushes are being replaced by water lilly. Open water areas are expanding and the exact number of acres of lost emergents should be quantified in the summer of 1986. There still exists a good variety of species in the higher areas of the marsh along southern edges. High water seems to be suppressing the purple loosestrife but it holds on much longer than all other emergents.

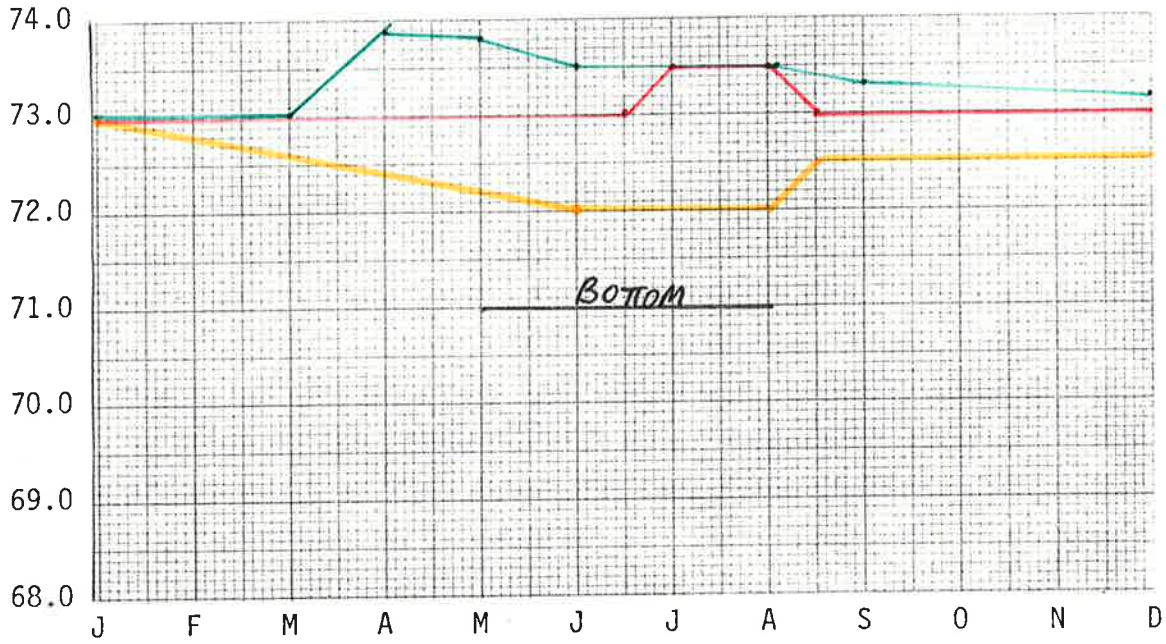
Facilities: Dikes are generally in excellent shape except for the dikes along the drainage ditch that runs along the south and west edge of the pool. The main water control structure is in good shape - it just hasn't had a chance to work due to high water.

Costs: Mowing, grading, purple loosestrife control, and boundary signing were the only costs for 1985.

B.2 Objectives of the 1986 Water Management

If lake levels permit, a partial drawdown will be accomplished to maintain existing emergent vegetation. A complete drawdown is not realistic and would probably cause a major increase in purple loosestrife. Levels will be raised slightly in the fall.

1. Unit Cedar Point Pool 2
2. Acres 135
3. Maximum elevation permissible 574
4. Flowline elevation of lowest structure 570
5. Elevation of general pool bottom 571
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 3

Species	%1984	%1985	%19__
Open water	50	60	
Cattail	35	25	
Bulrush	5	5	
Burreed	5	5	
Other	5	5	

8. Wildlife Use:

	Use Days 1984	1985	19__
Ducks	80,000	50,000	
Geese	20,000	20,000	
Great blue herons	5,000	5,000	

9. Map: See Appendix.

10. Purple loosestrife: Scattered plants sprayed along northern bank.

Cedar Point Pool 2

A.2 Effects of Past Year's Water Levels

Levels: This pool has no functional water control of its own and is managed as a part of Pool 1. Water was held stable between 573.1 and 573.8. Excess water was drained and the unit slowly lowered to 573.1 by mid-July.

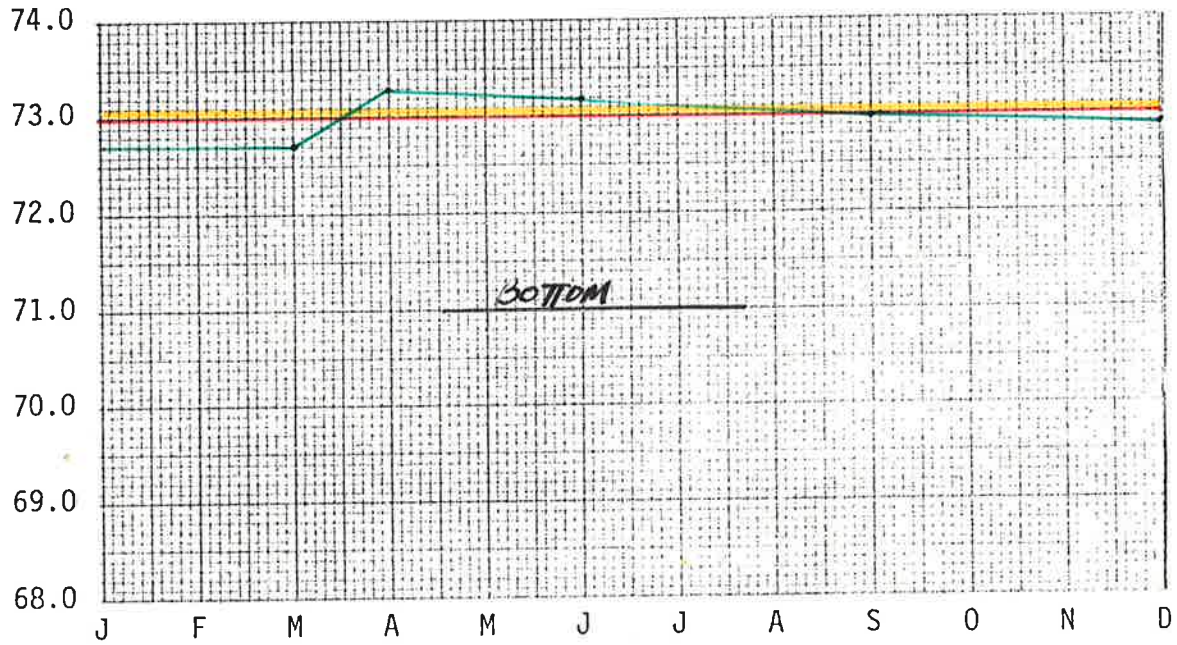
Results: This unit shows excellent distribution of various emergents and open water. In open water areas, dense stands of submergent vegetation were noted.

Facilities: The dikes of Pool 2 are in good shape. A culvert with screw gate needs to be installed between this pool and Pool 1.

B.2 Objectives of the 1985 Water Management

Water levels will be held stable to maintain the current conditions. However, because of the needs to control the invasion of purple loosestrife in the pool levels will be brought to slightly higher levels during July and August. This will allow better airboat use. Levels will be held at approximately 573.5 during the July-August period. If lake levels permit a partial drawdown will be accomplished to maintain existing emergent vegetation. A complete drawdown is not realistic and would probably cause a major increase in purple loosestrife. Levels will be raised slightly in the fall for loosestrife spraying.

1. Unit Cedar Point Pheasant Farm
2. Acres 155
3. Maximum elevation permissible 574 (573)
4. Flowline elevation of lowest structure 571
5. Elevation of general pool bottom 571
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 3

Species	%1984	%1985	%19__
Cattail	60	50	
Open water	20	30	
Burreed		10	
Arrowhead		10	

8. Wildlife Use:

	Use Days 1984	1985	19__
Ducks	150,000	150,000	
Geese	20,000	30,000	
Great blue herons	10,000	10,000	

9. Map: See Appendix.

10. Purple loosestrife: Scattered plants and clumps located throughout the unit. Higher levels and spraying is controlling it's spread.

Pheasant Farm

A.2 Effects of Past Year's Water Levels

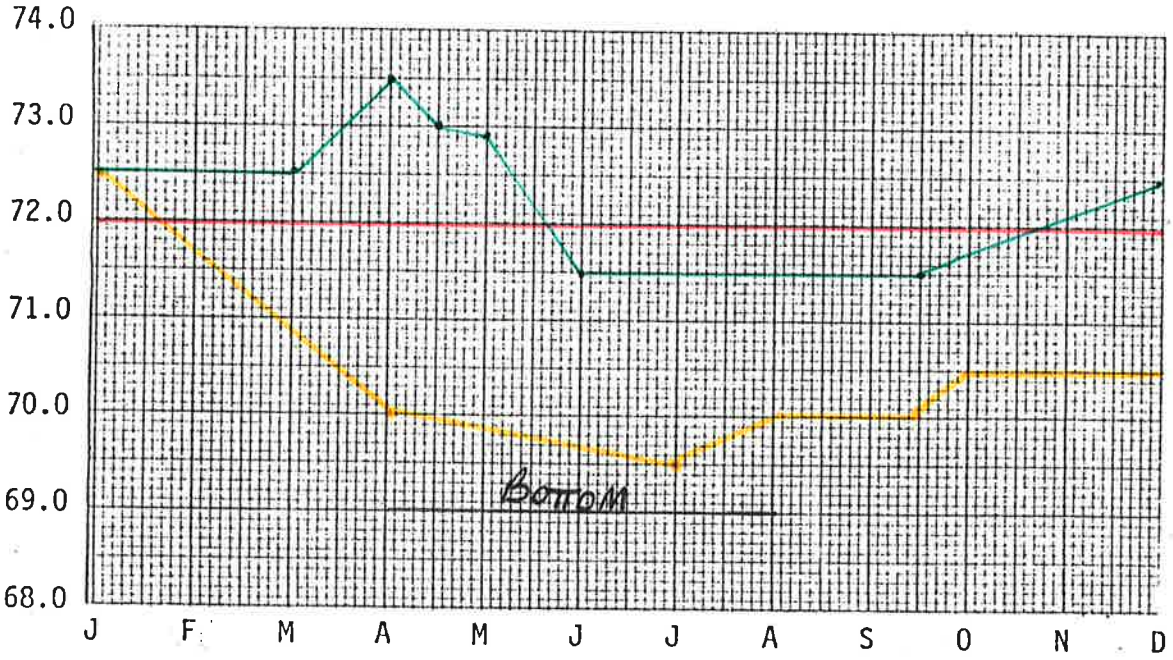
Levels: The water was held stable between 572.2 and 572.8 during the entire year, except during the spring runoff period. Excess water was drained and the unit slowly lowered to 572.2 by mid-July. It was then raised slightly in the late summer for purple loosestrife spraying.

Results: This unit shows good distribution of emergents and open water. Cattail growth is heavy to solid in some areas. Stable water levels have began to open up the dense cattail. Purple loosestrife was a problem on much of the area and major control efforts were made during August.

B.2 Objectives of the 1985 Water Management

Water levels will be held stable, but at a higher level than the past year to encourage cattail control by increasing muskrat populations and to control the invasion of purple loosestrife in the pool. Levels will be held at approximately 573.0 during the year.

1. Unit Darby Pool 1
2. Acres 200
3. Maximum elevation permissible 573.
4. Flowline elevation of lowest structure 566
5. Elevation of general pool bottom 569
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 4

Species	%1984	%1985	%19__
Open water	40	50	
Water lilly	10	20	
Bulrush	15	10	
Burreed SPA	15	10	
Cattail, arrowhead, other	20	10	

8. Wildlife Use:

	Use Days 1984	1985	19__
Ducks	190,000	175,000	
Geese	80,000	70,000	
Great blue heron	6,000	5,000	

9. Map: See Apprndix.

10. Purple loosestrife: Scattered plants along western and southern edges expanding. Sprayed in August.

Darby Pool 1

A.2 Effects of Past Year's Water Levels

Levels: Water levels in this unit reached 573.5 during the spring runoff period of late March, and remained high until mid-June when they were reduced by pumping. They were kept near 571.5 until October when they raised slightly.

Results: Considerable emergent vegetation in this unit was drown during the late spring and early summer. The acres of water lilly have expanded at the expense of emergents. Water levels were reduced in June in an effort to save some emergents. Muskrat use of the area in the fall was moderate. Although not mapped excellent stands of submergents were present in the eastern open water areas.

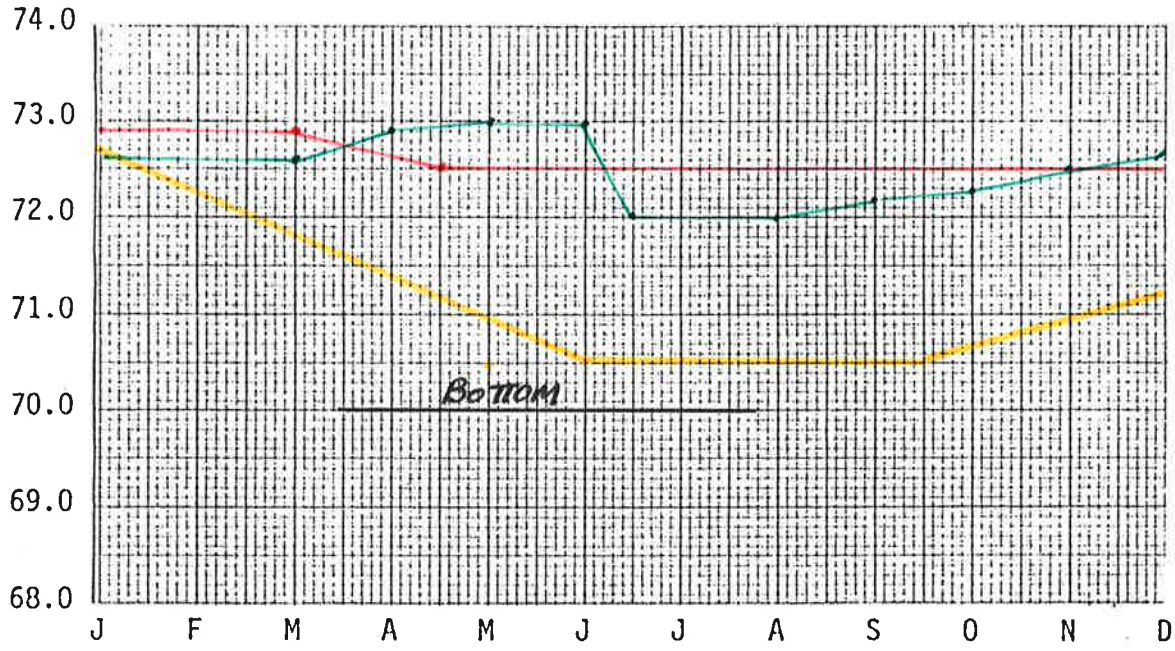
Facilities: This pool is in excellent condition with the dikes well rip-rapped.

Costs: Pumping was done using a 16" Crisafulli pump for 24 hours during mid-June at a cost of approximately $250.

B.2 Objectives of the 1985 Proposed Water Levels

A partial drawdown will be attempted during the year in an effort to improve emergent growth. Levels may be raised slightly during late July and August for purple loosestrife control.

1. Unit Darby Pool 2
2. Acres 25
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Elevation of general pool bottom 570
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 4

Species	%1984	%1985	%19__
Open water/water lilly	30	40	
Dying cattail	0	40	
Cattail	60	10	
Other	10	10	

8. Wildlife Use:

	Use Days 1984	1985	19__
Ducks	15,000	10,000	
Geese	1,000	1,000	
Great blue herons	500	500	

9. Map: See Appendix.

10. Purple loosestrife: A few scattered plants observed and sprayed.

Darby Pool 2

A.2 Effects of Past Year's Water Levels

Levels: Water levels were high through the spring. Pumping in early June dropped the level 1 foot to 572. Time did not permit additional pumping.

Results: Emergent vegetation is almost gone in this pool. Scattered plants of purple loosestrife were noted along the southern edge of the pool. White water lilly and duckweed is fast becoming the dominant vegetation.

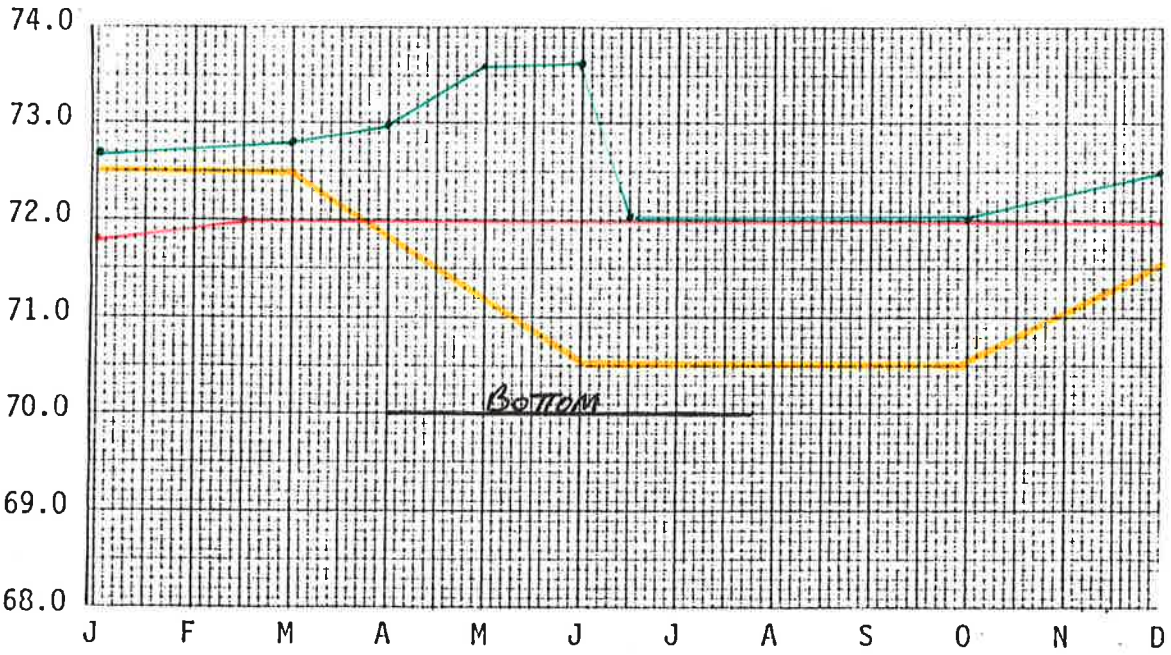
Facilities: Unprotected dikes along the north and east banks are eroding and in need of resloping and rock.

Costs: Pumping - see Pool 4 for pump costs.

B.2 Objectives of the 1985 Proposed Water Levels

A partial drawdown is proposed to maintain some emergents for diversity. Levels may be raised slightly in late summer for purple loosestrife control.

1. Unit Darby Pool 3
2. Acres 25
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569
5. Elevation of general pool bottom 570
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned



7. Vegetation: Marsh Successional Stage(1-5) 5

Species	%19 84	%19 85	%19
Open Water	80	90	
Aquatic smartweed	10	5	
Other	10	5	

8. Wildlife Use:

	Use Days 19 84	19 85	19
Ducks	10,000	10,000	
Geese	2,000	2,000	
Great blue herons	200	200	

9. Map: See Appendix

10. Purple loosestrife: A few plants observed along dikes.

Darby Pool 3

A.2 Effects of Past Year's Water Levels

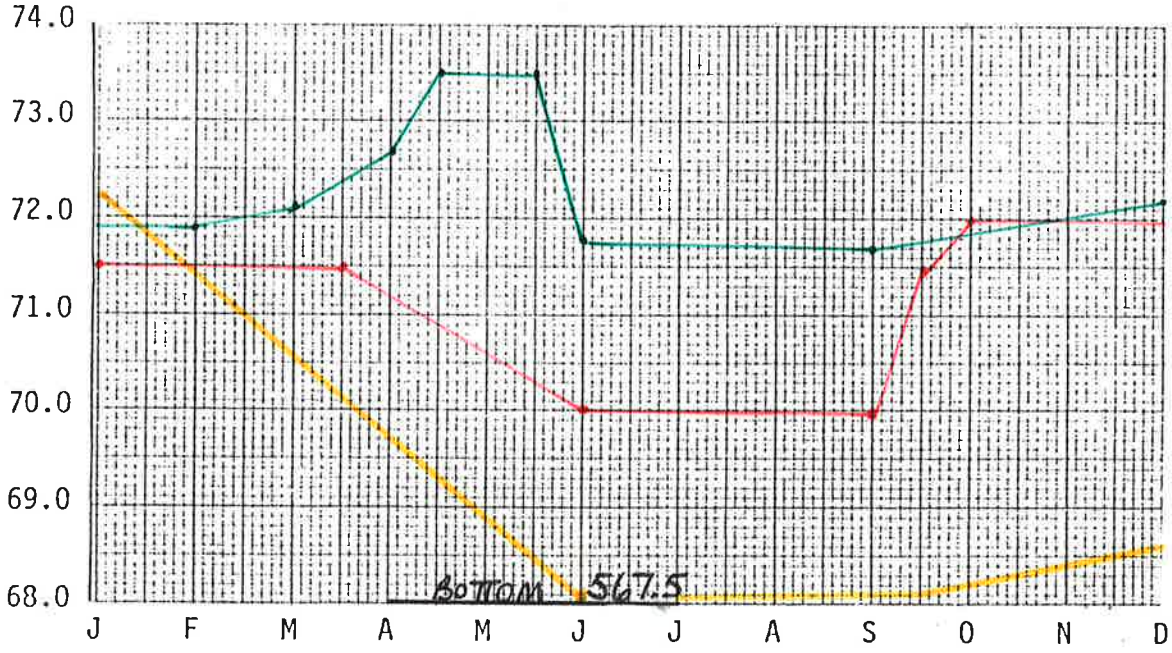
Levels: Water levels in spring were up to 1½ feet above planned levels. Pumping in June dropped the water about 18".

Results: Almost all emergents are gone due to high water. Aquatic smartweed and water lilly are all that is left above the surface.

B.2 Objectives of the 1985 Proposed Water Levels

A partial drawdown will be accomplished to favor submerged aquatics and any emergents remaining. Lake levels will probably prohibit any drawdown.

1. Unit Darby Pool 4
2. Acres 170
3. Maximum elevation permissible 573.5
4. Flowline elevation of lowest structure 566.6
5. Elevation of general pool bottom 567.5
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned



7. Vegetation: Marsh Successional Stage(1-5) 5

Species	%1984	%1985	%19__
Open water	90	90	
Water lilly	2	2	
Cattail	1	1	
Cottonwood/willow	5	5	
Other	2	2	

8. Wildlife Use:

	Use Days 1984	1985	19__
Ducks	5,000	5,000	
Geese	2,000	2,000	
Great blue herons	500	500	

9. Map: See Appendix.

10. Purple loosestrife: A few small clumps observed along southeast shore.

Darby Pool 4

A.2 Effects of Past Year's Water Levels

Levels: Water was as much as 3½' above planned levels in April and May. Pumping in June dropped the pool about 1½'. Gravity drainage was not possible.

Results: This pool contains a large open water area with little vegetation around the edges. The reduction of water levels in mid-June was an attempt to improve vegetation growth, but little improvement was noted.

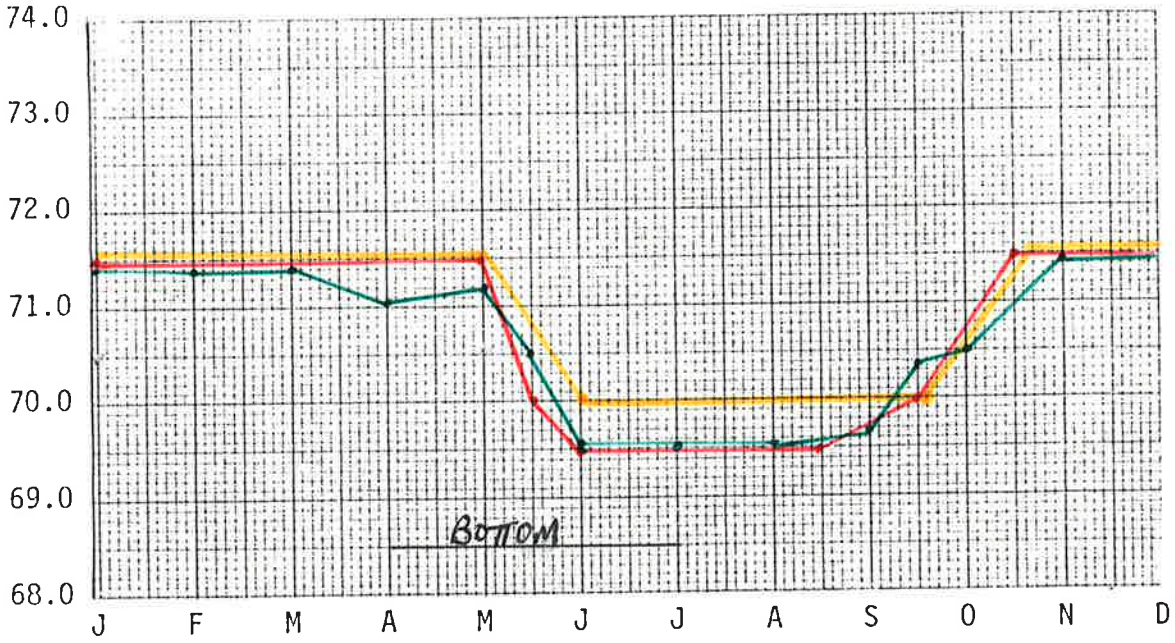
Facilities: This unit needs major drawdown for re-vegetation. Since this will involve pumping a large amount of water, it will require considerable funds. No funds have been available for this and none are programmed in the foreseeable future.

Costs: Pumping of this unit was done for one week in mid-June using two 16" Crisifulli, tractor powered pumps, 24 hours a day. This lowered the water level approximately 18" pumped over 500 acre feet of water and cost about $1,800. Pumping of this unit also requires the pumping of water from a considerable amount of private land which drains into this unit.

B.2 Objectives of the 1985 Proposed Water Levels

A drawdown as dry as possible will be accomplished by gravity drainage. There would be an excellent response by annuals to a drawdown. Realistically it won't happen in 1986.

1. Unit Navarre Pool 1
2. Acres 130
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569.5
5. Elevation of general pool bottom 568.5
6. Water levels: 85 Planned ----; 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 3

Species	%1984	%1985	%19__
Open water/water lilly	40	40	
Cattail	30	30	
Bulrush	10	10	
Cottonwood/willow	10	10	
Other	10	10	

8. Wildlife Use:

	Use Days 1984	1985	19__
Duck	40,000	40,000	
Geese	20,000	20,000	
Great blue herons	2,000	2,000	

9. Map: See Appendix.

10. Purple loosestrife: One small clump observed, sprayed and pulled a few weeks later.

Navarre Pool 1

A.2 Effects of Past Year's Water Levels

Levels: Pool 1 has been drawndown to the flowline elevation of lowest drain structure for several years. That elevation is 1' above the general pool bottom. Water levels were kept close to that planned.

Results: Vegetation in the unit is somewhat dense around the central deeper water basin. There is a good diversity of species and species mixes present. Some smaller open water areas are present in the dense vegetation.

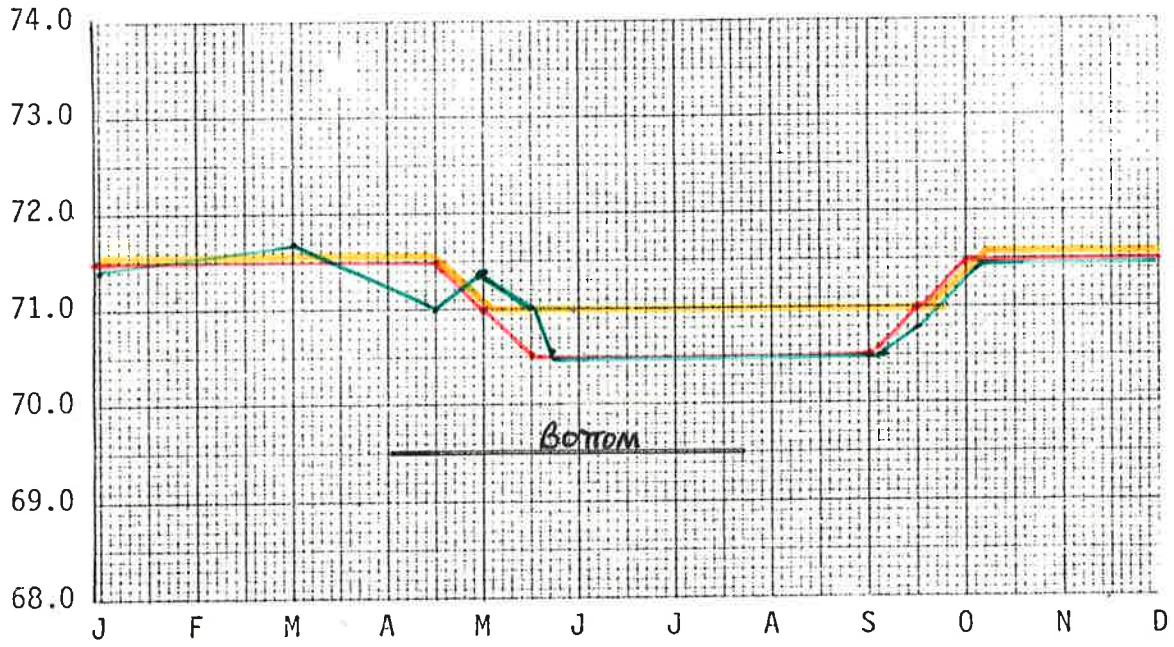
Facilities: See Pool 2

Costs: See Pool 2

B.2 Objectives of the 1986 Proposed Water Levels

Drawdown to 6" above flowline elevation of lowest drain structure which will be 1½' above general pool bottom. These levels should cause an increase in muskrats and a change from the year after year drawdown. Monitor 1986 photos to determine if open water increases and species diversity changes.

1. Unit Navarre Pool 2
2. Acres 340
3. Maximum elevation permissible 573
4. Flowline elevation of lowest structure 569.5
5. Elevation of general pool bottom 569.5
6. Water levels: 85 Planned —, 85 Actual —, 86 Planned —.



7. Vegetation: Marsh Successional Stage(1-5) 3

Species	%19 84	%19 85	%19
Cattail	45	40	
Bulrush	15	15	
Burreed	10	10	
Water lilly	15	20	
Other	15	15	

8. Wildlife Use:

	Use Days 19 84	19 85	19
Ducks	120,000	150,000	
Geese	60,000	70,000	
Great blue herons	8,000	10,000	

9. Map: See Appendix.

10. Purple loosestrife: None observed.

Navarre Pool 2

A.2 Effects of Past Year's Water Levels

Levels: Water levels were maintained per the plan for the year with minor variations. The general elevation of the pool bottom of 568.5 was raised to 569.5. The elevation of 568.5 reflects the bottom of the central bay and not the bottom of the marsh all around the bay. When the unit is pumped to the flowline elevation of the lowest structure 569.5 all of the bottom except the bay is exposed.

Results: Vegetation response was excellent. In solid cattail stands in the northwest and west central portions openings developed. There is a wide variety of emergent species and a desirable interspersion of species and species mixes.

Facilities: With the exception of boundary signs all facilities are maintained by Toledo Edison. During the year they added riprap to several hundred feet of dike along the outside of the southern dike.

Costs: ?

B.2 Objectives of the 1986 Proposed Water Levels

Drawdown to 1½' above pool bottom or a increase in summer levels of 6" above 1986 summer levels. There should be an increase in open water to vegetation interspersion. Muskrat numbers should increase and cause more openings. Wetland nesting species should do well with ducks and geese using muskrat lodges for nesting.

Classification System for
Ottawa National Wildlife Refuge

Instructions:

1. For an area that has a mixture of species, list the dominant species (greatest aerial canopy), then a slash ('/'), then the second most prevalent species, then a slash, and then the third most prevalent species. List no more than three species in a mixture for an area.

2. For areas that have been manipulated (disked, sprayed, mowed), assign a number to the polygon as well as a species identification. The numbers should be arbitrarily assigned but without duplication and start with the number 001. The Refuge Manager will describe the treatment given to each area using the number as a key. The treatment will be indicated as: MO for mowed, SP for sprayed, and DI for disced. The date of treatment will also be recorded.

3. The minimum mapping unit for single species stands is 0.1 acre. The minimum mapping unit for multiple species stands is 0.5 acre.

GENERAL

H2O Open water
DIK Dike

EMERGENT SPECIES

TYL Cattail Live (Typha spp.)
TYD Cattail Dead (Typha spp.)
SPA Burreed (Sparganium eurycarpum)
SCI Bulrush (Scirpus spp.)
ELE Spike-rush (Eleocharis spp.)
HIB Marsh mallow (Hibiscus palustris)
SAG Arrowhead (Sagittaria latifolia)
PIW Pickerelweed (Pontederia cordata)
POC Aquatic smartweed (Polygonum coccineum)
LYT Purple loosestrife (Lythrum salicaria)
DEC Swamp loosestrife (Decodon verticillatus)

TREES and SHRUBS

POP Cottonwood (Populus spp.)
FRA Green ash (Fraxinus pennsylvanica)
COR Gray-osier dogwood (Cornus ____)
CEP Buttonbush (Cephalanthus occidentalis)
SAL Willow (Salix spp.)

MUDFLAT SPECIES

ABU Velvet-leaf (Abutilon theophrasti)
ALI Water plantain (Alisma subcordatum)
BID Beggar-ticks (Bidens spp.)
CAL Blue-joint grass (Calamagrostis canadensis
ECH Millet (Echinochloa spp.)
JUN Juncus (Juncus spp.)
PHA Reed-canarygrass (Phalaris arundinacea)
POL Smartweed (non-aquatic) (Polygonum spp.)

FLOATING LEAVED SPECIES

NUP Waterlily (Nuphar spp.)
NEL Water lotus (Nelumbo lutea)
LEM Lesser duckweed (Lemna minor)

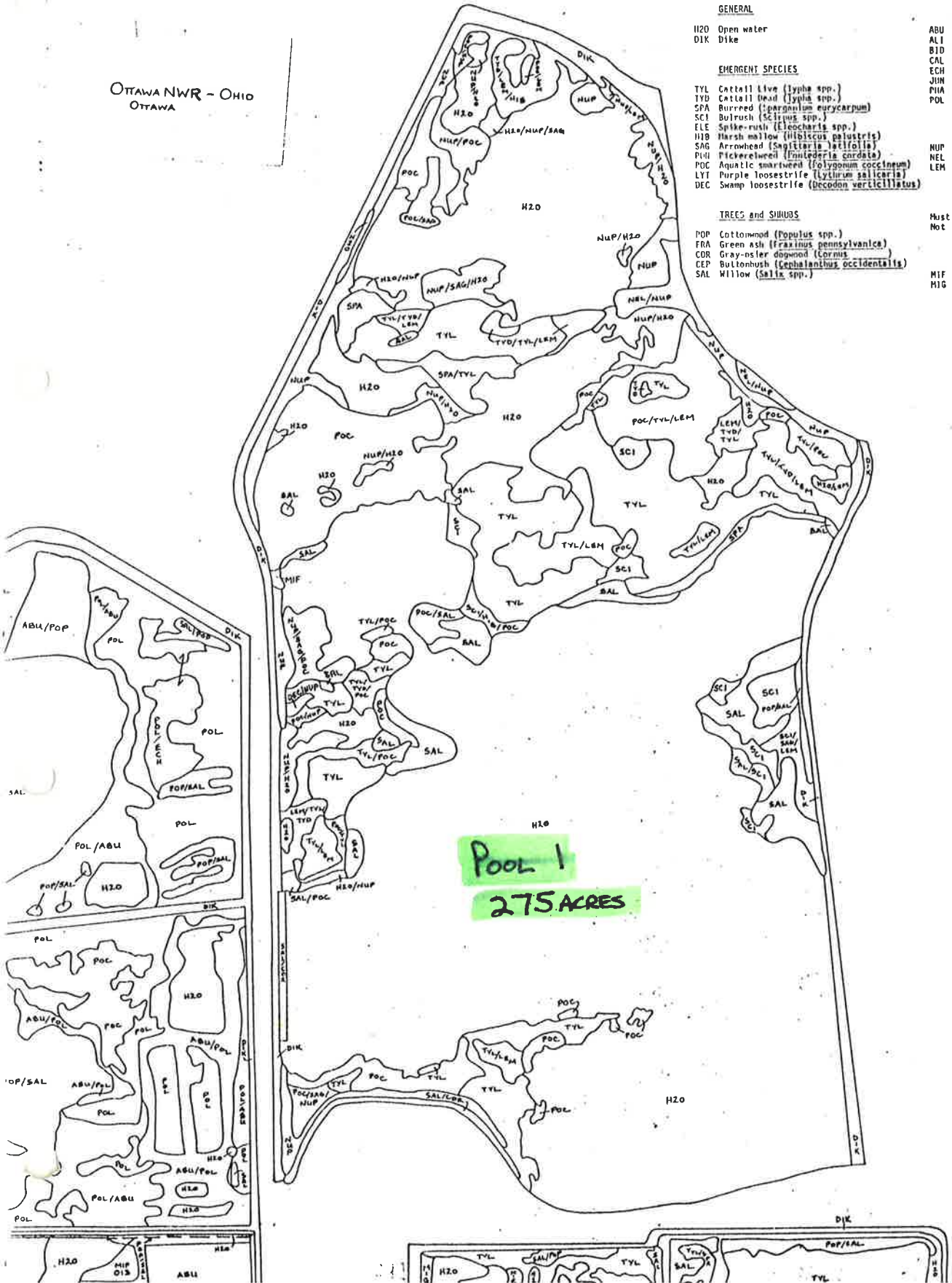
SUBMERGENT SPECIES

Must be ground mapped.
Not identifiable from the available photography

UPLAND MIXTURES

MIF Mixed forbs in uplands
MIG Mixed grasses in uplands

OTTAWA NWR - OHIO
OTTAWA



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GENERAL

) Open water
k Dike

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D Cattail Dead (Typha spp.)
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CI Bulrush (Scirpus spp.)
E Spike-rush (Eleocharis spp.)
IB Marsh mallow (Hibiscus palustris)
AG Arrowhead (Sagittaria latifolia)
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YI Purple loosestrife (Lythrum salicaria)
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SAL Willow (Salix spp.)

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NEL Water lotus (Nelumbo lutea)
LEM Lesser duckweed (Lemna minor)

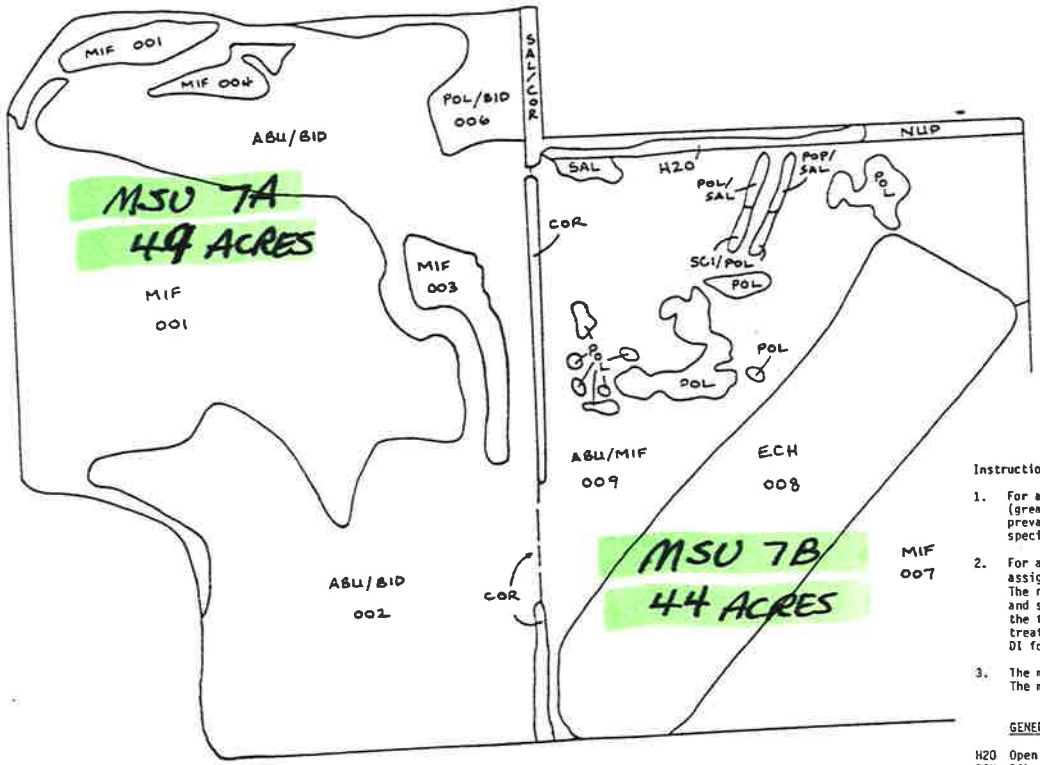
SUBMERGENT SPECIES

Must be ground mapped.
Not identifiable from the available photography.

UPLAND MIXTURES

MIF Mixed forbs in uplands
MIG Mixed grasses in uplands

A2



9/10/85

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DIK Dike

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SUBMERGENT SPECIES

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Not identifiable from the available photography

UPLAND MIXTURES

MIF Mixed forbs in uplands

A4

9/10/85

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SUBMERGENT SPECIES

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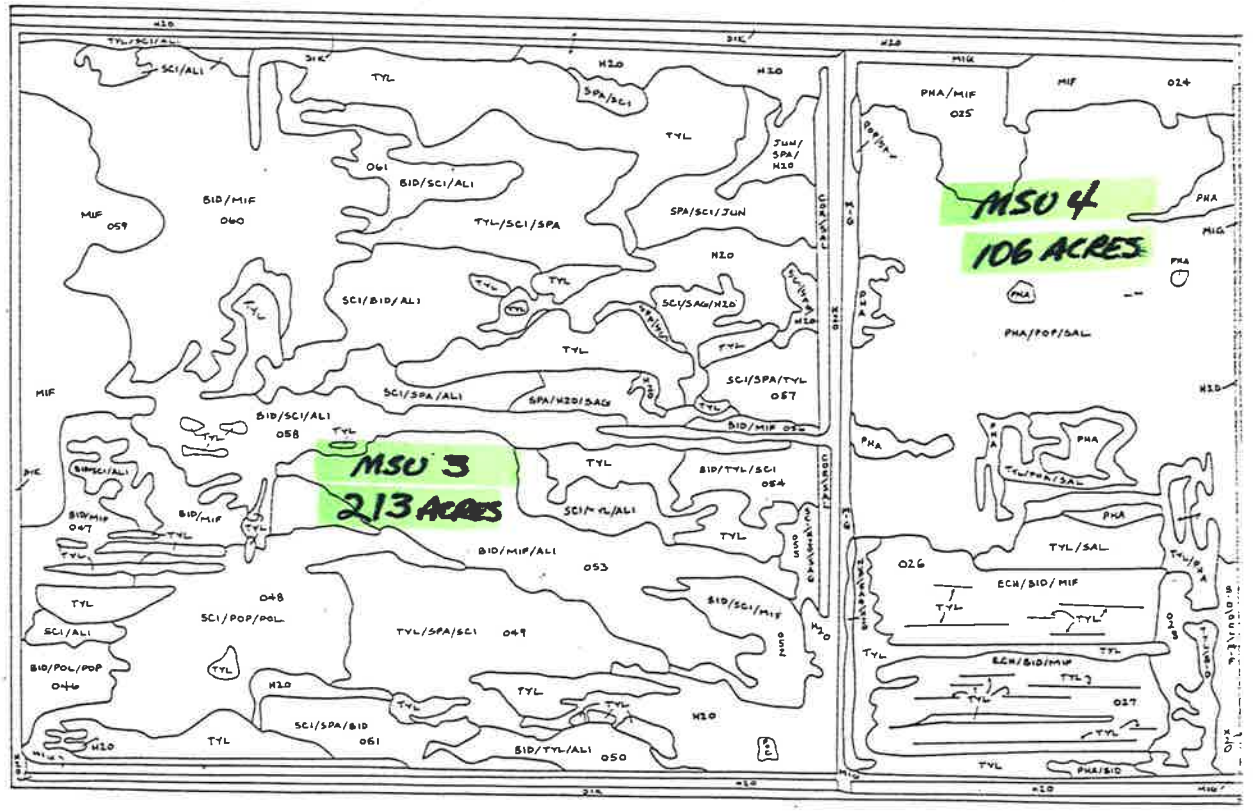
Not identifiable from the available photography.

UPLAND MIXTURES

MIF Mixed forbs in uplands
MIG Mixed grasses in uplands



9/10/05

Classification System for Ottawa National Wildlife Refuge

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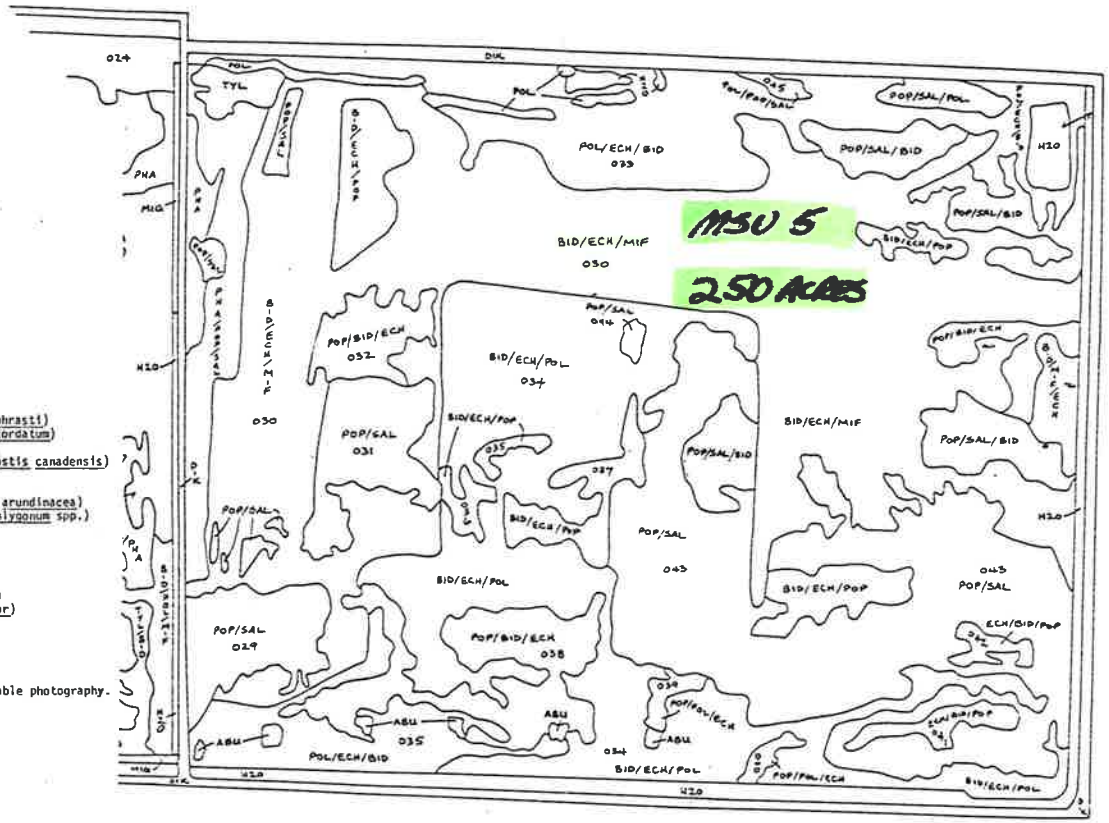
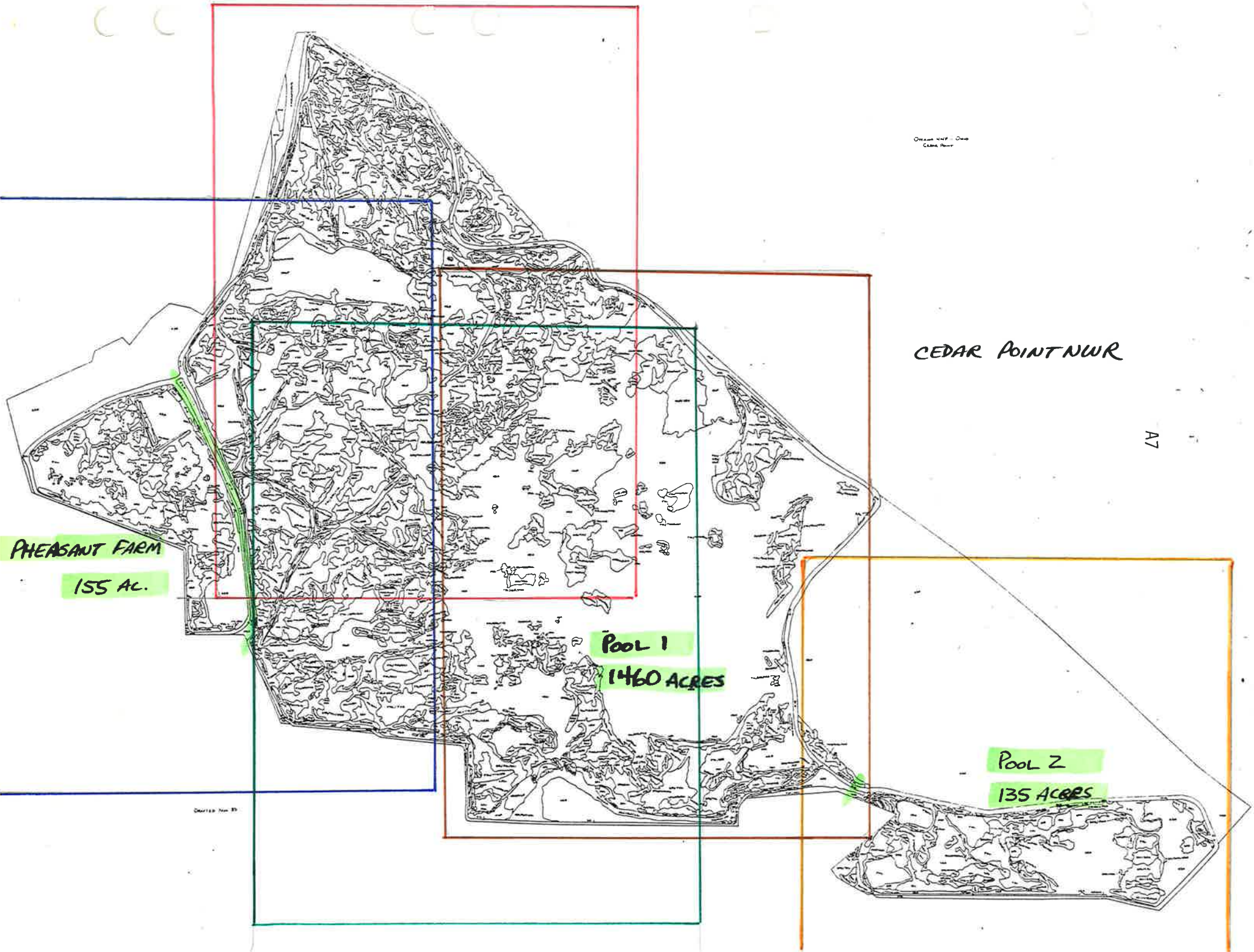
SUBMERGENT SPECIES

Must be ground mapped.
Not identifiable from the available photography.

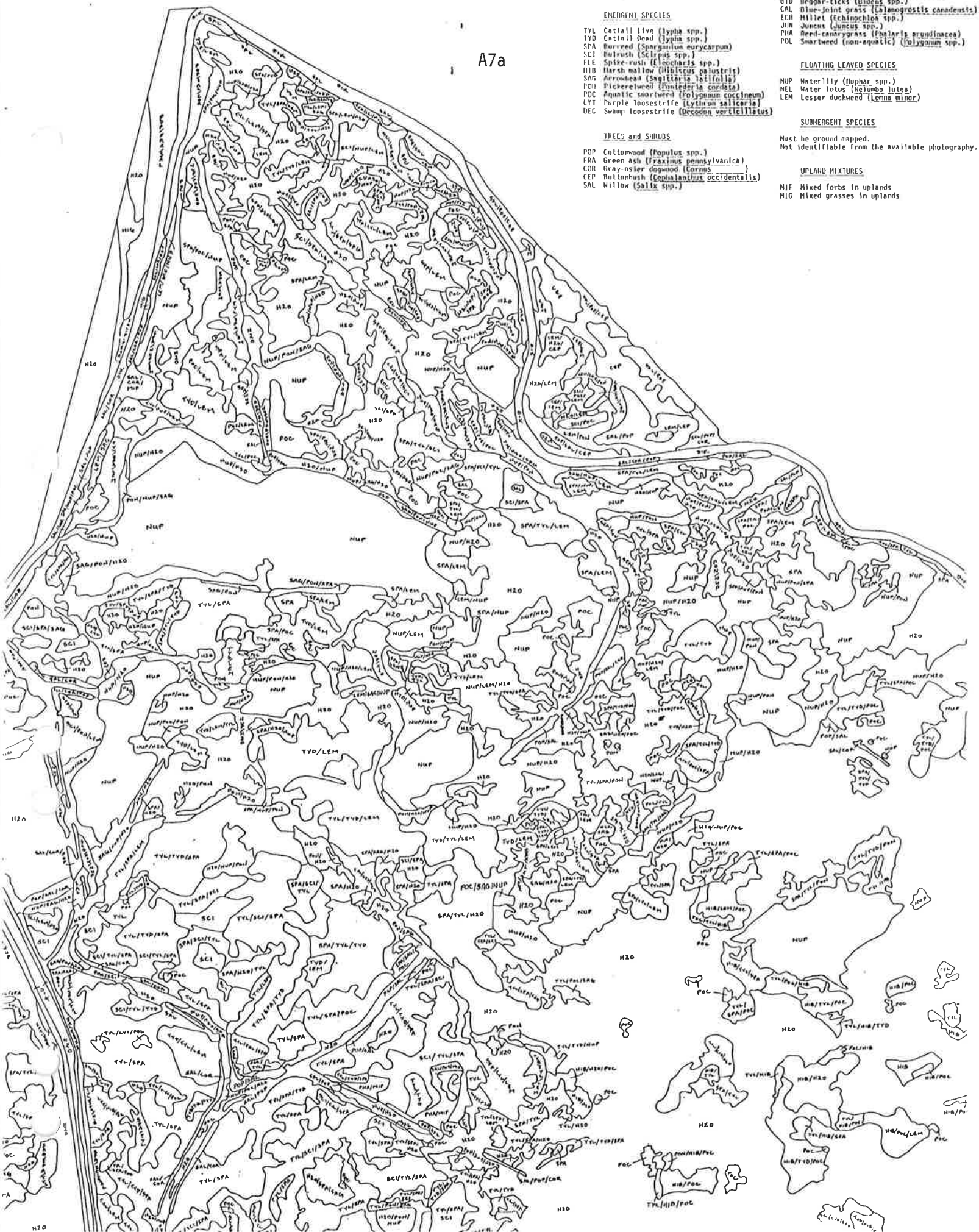
UPLAND MIXTURES

MIF Mixed forbs in uplands
MIG Mixed grasses in uplands




CEDAR POINT NWR
PHEASANT FARM
155 AC.
POOL 1
1460 ACRES
POOL 2
135 ACRES

A7



GENERAL

H2O Open water
DIK Dike

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FLOATING LEAVED SPECIES

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NEL Water lotus (Nelumbo lutea)
LEM Lesser duckweed (Lemna minor)

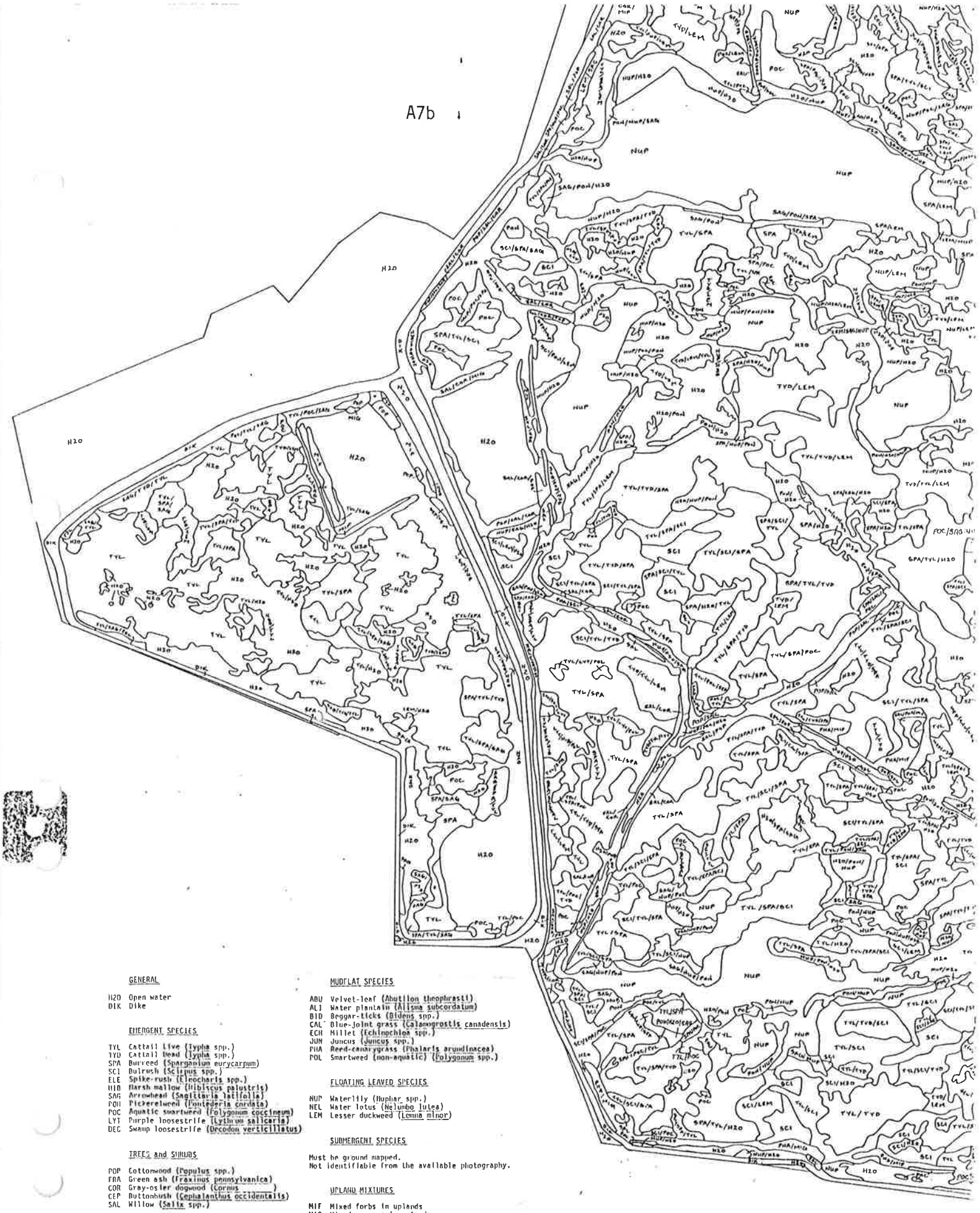
SUBMERGENT SPECIES

Must be ground mapped.
Not identifiable from the available photography.

UPLAND MIXTURES

MIF Mixed forbs in uplands
MIG Mixed grasses in uplands

A7b



GENERAL

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Not identifiable from the available photography.

UPLAND MIXTURES

MIF Mixed forbs in uplands
MIG Mixed grasses in uplands

GENERAL

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PON Pickerelweed (Pontederia cordata)
POC Aquatic smartweed (Polygonum coccineum)
LYT Purple loosestrife (Lythrum salicaria)
DEC Swamp loosestrife (Decodon verticillatus)

TREES and SHRUBS

POP Cottonwood (Populus spp.)
FRA Green ash (Fraxinus pennsylvanica)
COR Gray-osier dogwood (Cornus)
CEP Buttonbush (Cephalanthus occidentalis)
SAL Willow (Salix spp.)

HUDFLAT SPECIES

ABU Velvet-leaf (Abutilon theophrasti)
ALI Water plantain (Alisma subcordatum)
BID Beggar-ticks (Bidens spp.)
CAL Blue-joint grass (Calamagrostis canadensis)
ECH Millet (Echinochloa spp.)
JUN Juncus (Juncus spp.)
PHA Reed-canarygrass (Phalaris arundinacea)
POL Smartweed (non-aquatic) (Polygonum spp.)

FLOATING LEAVED SPECIES

NUP Waterlily (Nuphar spp.)
NEL Water lotus (Nelumbo lutea)
LEM Lesser duckweed (Lemna minor)

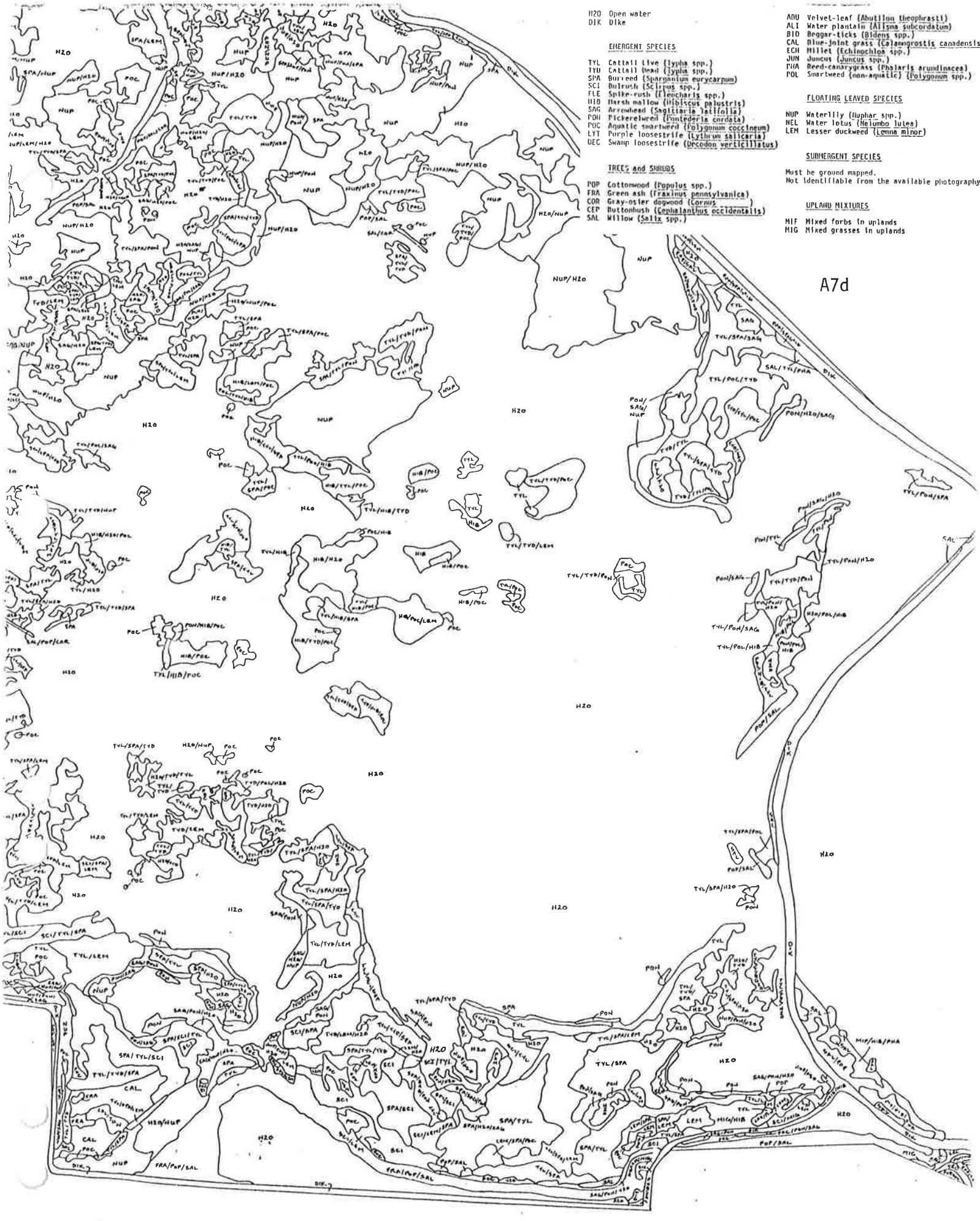
SUBMERGENT SPECIES

Must be ground mapped.
Not identifiable from the available photography.

UPLAND MIXTURES

MIF Mixed forbs in uplands
MIG Mixed grasses in uplands

A7c


H2O Open water
DIK Dike
EMERGENT SPECIES
TYL Cattail Live (Typha spp.)
TYD Cattail Dead (Typha spp.)
SPA Burreed (Sparganium eurycarpum)
SCI Bulrush (Scirpus spp.)
FLE Spike-rush (Eleocharis spp.)
HIB Marsh mallow (Hibiscus palustris)
SAG Arrowhead (Sagittaria latifolia)
POH Pickerelweed (Pontederia cordata)
POC Aquatic smartweed (Polygonum coccineum)
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TREES and SHRUBS
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NUP Waterlily (Nuphar spp.)
NEL Water lotus (Nelumbo lutea)
LEM Lesser duckweed (Lemna minor)
SUBMERGENT SPECIES
Must be ground mapped.
Not identifiable from the available photography.
UPLAND MIXTURES
MIF Mixed forbs in uplands
MIG Mixed grasses in uplands
A7d

A7e

GENERAL

H2O Open water
DIK Dike

EMERGENT SPECIES

TYL Cattail Live (Typha spp.)
TYU Cattail Dead (Typha spp.)
SPA Burreed (Sparganium eurycarpum)
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SUBMERGENT SPECIES

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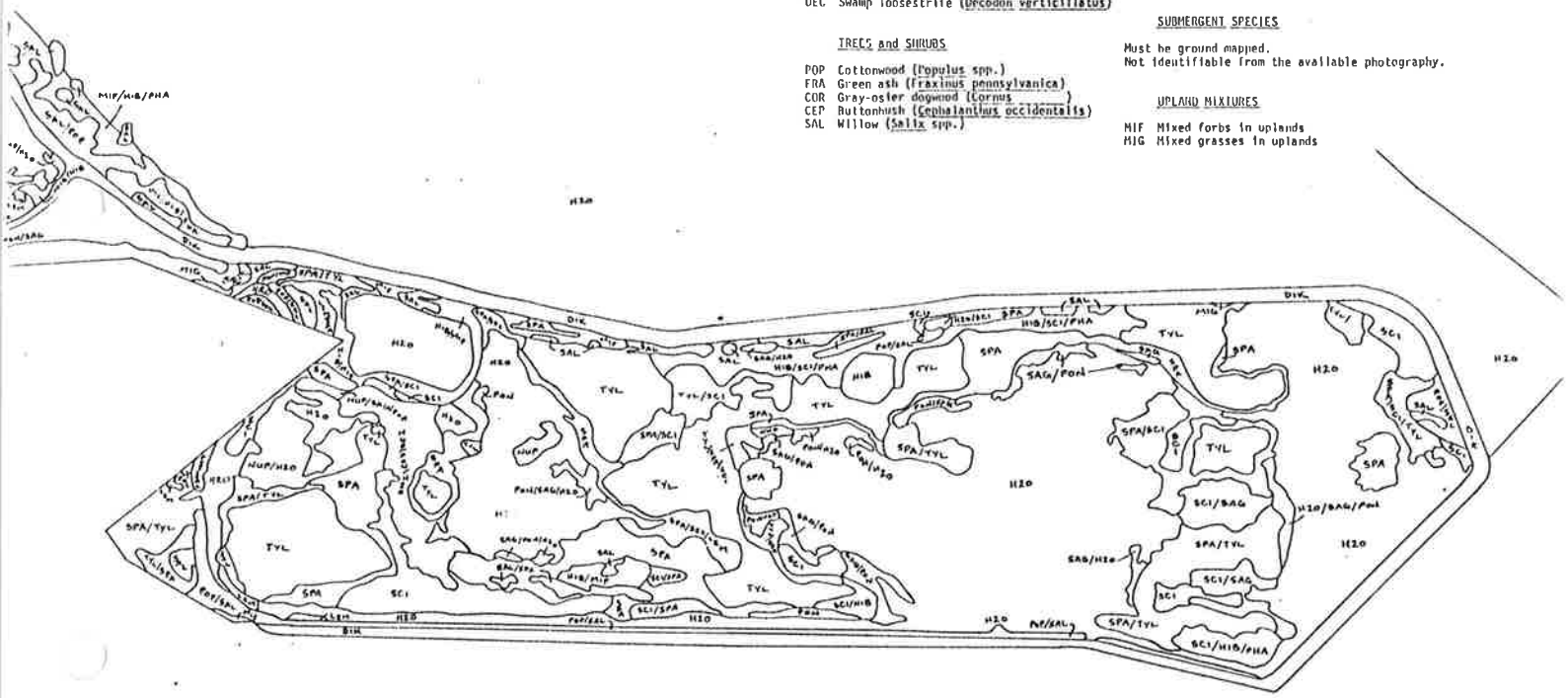
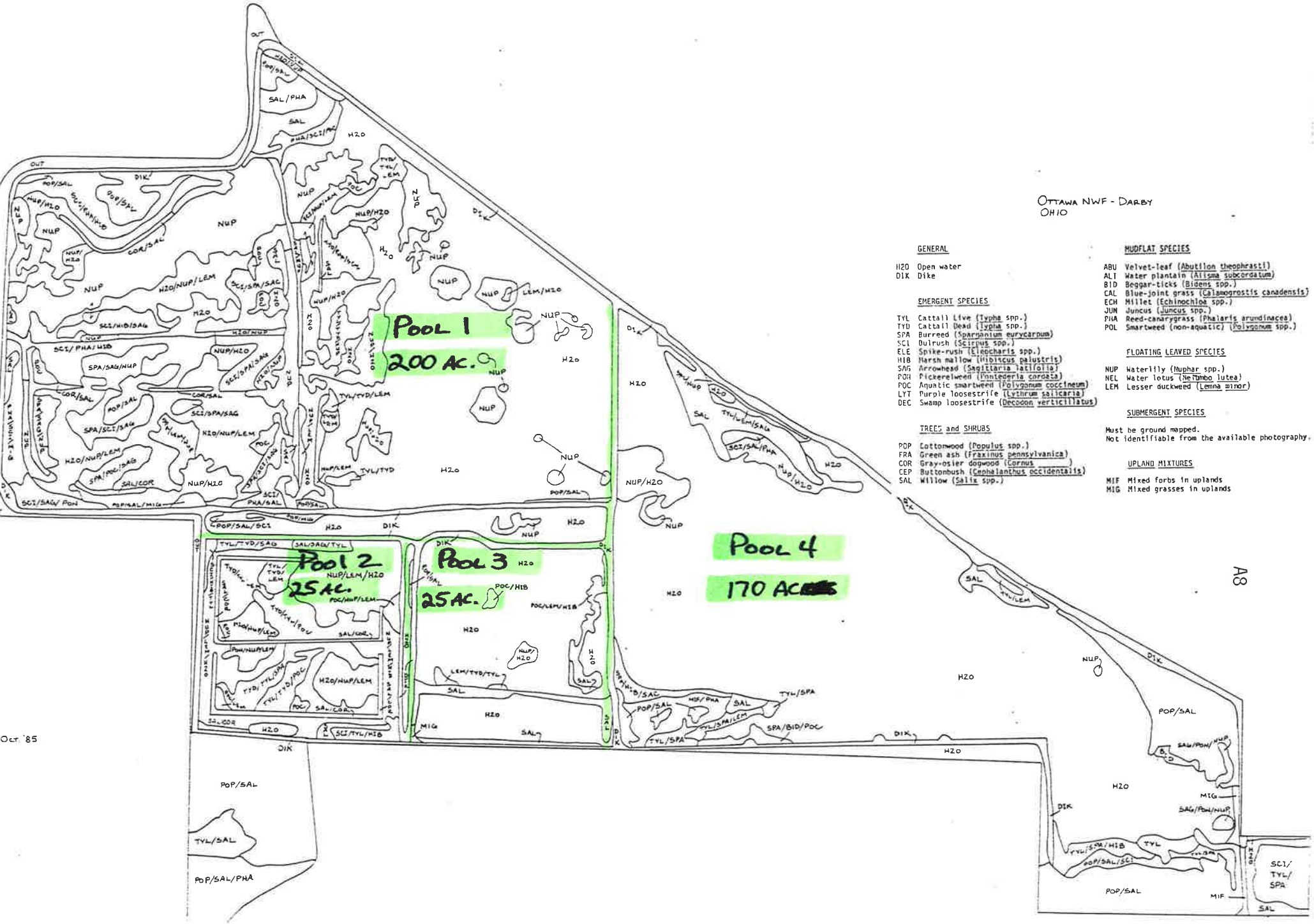
Not identifiable from the available photography.

UPLAND MIXTURES

MIF Mixed forbs in uplands
MIG Mixed grasses in uplands





OTTAWA NWF - DARBY
OHIO

GENERAL

H2O Open water
DIK Dike

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SUBMERGENT SPECIES

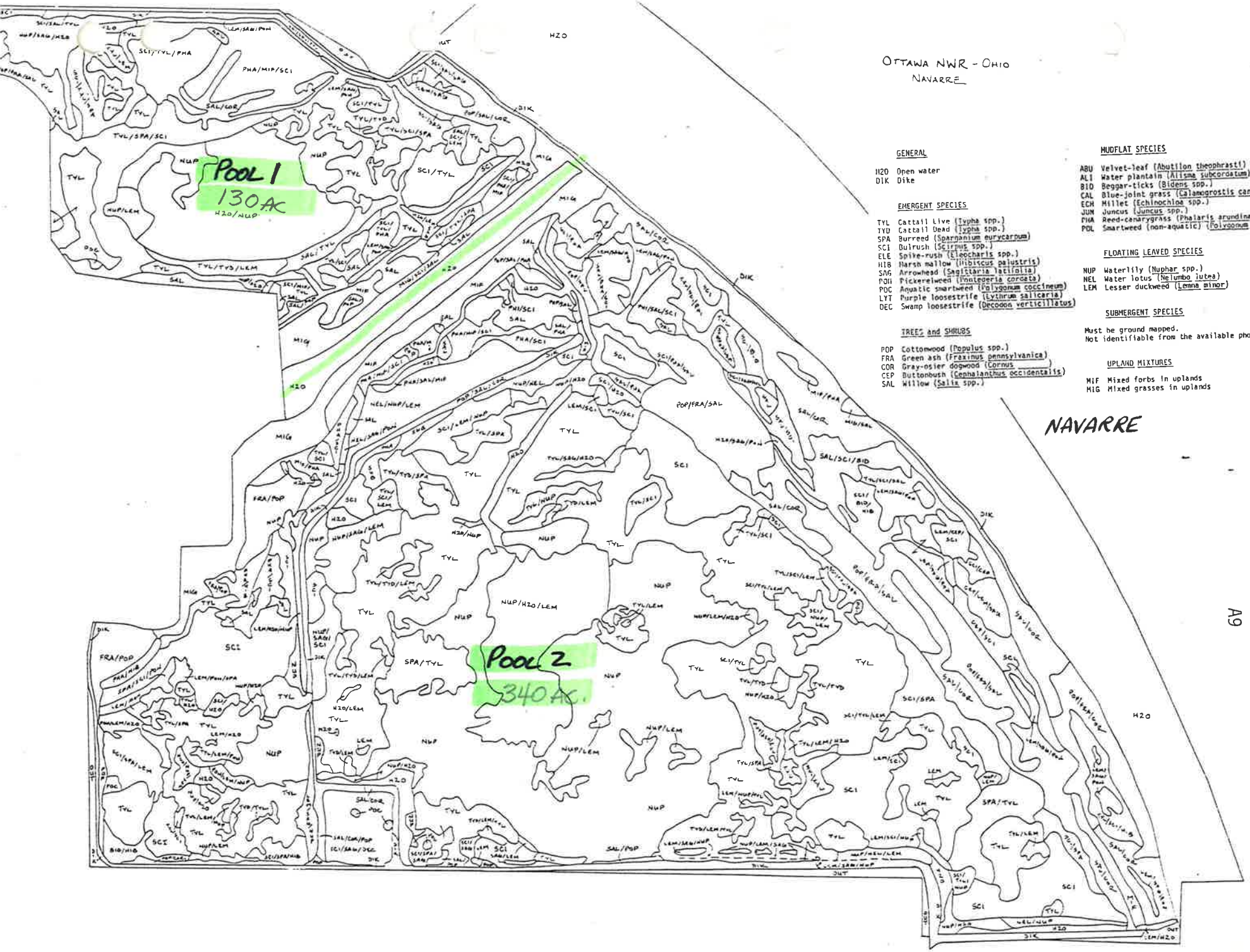
Must be ground mapped.
Not identifiable from the available photography.

UPLAND MIXTURES

MIF Mixed forbs in uplands
MIG Mixed grasses in uplands

A8

Oct '85


OTTAWA NWR - OHIO
NAVARRE
GENERAL
H2O Open water
DIK Dike
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Not identifiable from the available photography.
UPLAND MIXTURES
MIF Mixed forbs in uplands
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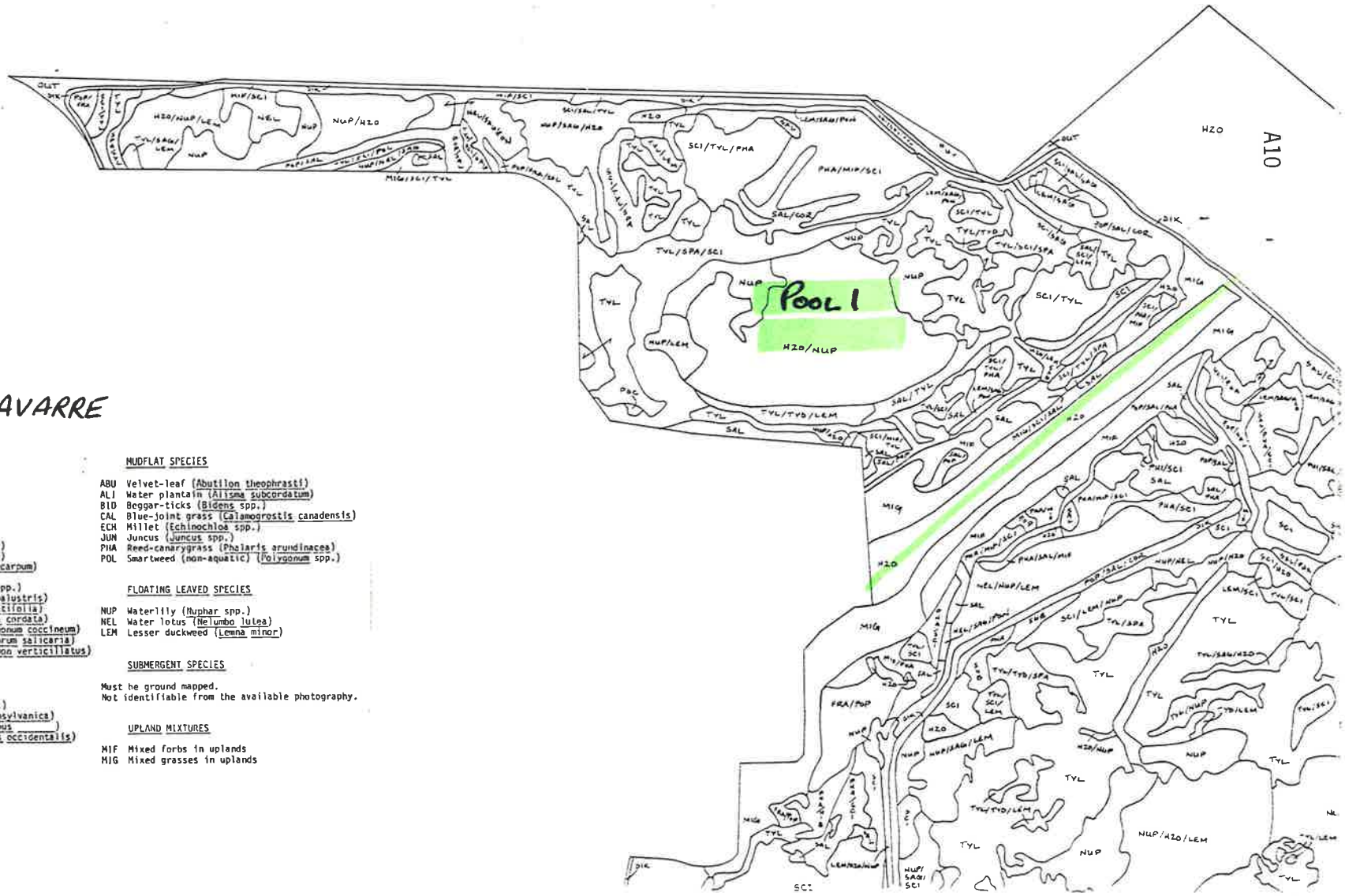
NAVARRE
POOL 1
130 AC
H20/NUP
POOL 2
340 AC.



GENERAL

H2O Open water
DIK Dike

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